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A HANDBOOK OF GARDEN IRISES

I. Polyhymnia, a Regeliocyclus hybrid.

(I. Korolkowi x I. susiana). (Two-thirds size).

A HANDBOOK OF GARDEN IRISES

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PREFACE.

SOME apology is perhaps needed for the production of a third book on Irises. My excuse is that of the two former volumes the earlier and smaller has long been out of print while the large monograph was written primarily from the botanical and not from the horticultural point of view. The small book did not aim at describing all the species. It was rather a rapid survey of Irises as garden plants and the fact that it was written in the space of a long week-end at the time of the Coronation of 1911 is evidence that it was never intended to be exhaustive.

The Genus Iris with its life-size, coloured illustrations of some fifty species, and full botanical descriptions of all the known species, was the result of an enquiry into the botany of Irises and of an attempt to cultivate all the available species and to raise them from seed.

The present volume is intended for gardeners, though it is hoped that the information as to the distribution of the various species, the speculations as to their affinities and the botanical details which in certain cases must be understood in order to separate closely-allied species will prove no less welcome than the hints as to their cultivation, which are the results of an experience of some twenty years.

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Each section of the genus is treated as a whole in a separate chapter and the short descriptions of the individual species, which follow, must be read in conjunction with it. This method necessarily involves a certain amount of repetition but without it it would hardly be possible to deal with each section as a whole. No attempt is made to describe each species in minute detail, in all its parts or to give its exact distribution by reference to dried herbarium specimens in the various museum collections. For this information the reader is referred to the *Genus Iris*. It is hoped, however, that enough information is given about all the species, which are at all adequately known, to enable them to be recognized and cultivated with some chance of success.

The treatment of the innumerable garden hybrids has necessarily been more difficult and probably may seem more inadequate than that of the species. It is obviously impossible to describe every one and equally difficult to decide which are the best varieties or those most worthy of description. Moreover, any list compiled to-day will necessarily be largely out of date a few years hence.

It was no easy matter to obtain illustrations for a book of these dimensions, for scarcely any of them could be lifesize. Photographs of Irises are seldom satisfactory and the cost of coloured drawings and of their reproduction was prohibitive. In the end it was decided to use as illustrations a series of drawings in monochrome by Miss E. Kaye. In most cases these have been drawn direct from the living plant, but in

a few instances, where living plants were not available at the time, she was able, by the kindness of the late Hon. N. Charles Rothschild, to use specimens from an admirable series of coloured drawings of the Irises of Europe by F. H. Round. The cases, in which Mr. Round's drawings were used, are I. aphylla, I. pallida, I. variegata, I. sibirica, I. spuria (flower stem only), I. xiphium, I. xiphioides, and I. juncea.

It might be thought that a key should have been given which would enable any one who was totally ignorant of Irises to identify any species. I have spent much time in attempting to construct such a key but have come to the conclusion that it would necessarily be so intricate as to be of little use to the beginner. I have, therefore, merely given at the end of Chapter II, page 11, a key to the various sections of the genus and inserted in the general observations on each section a key to the species which compose it.

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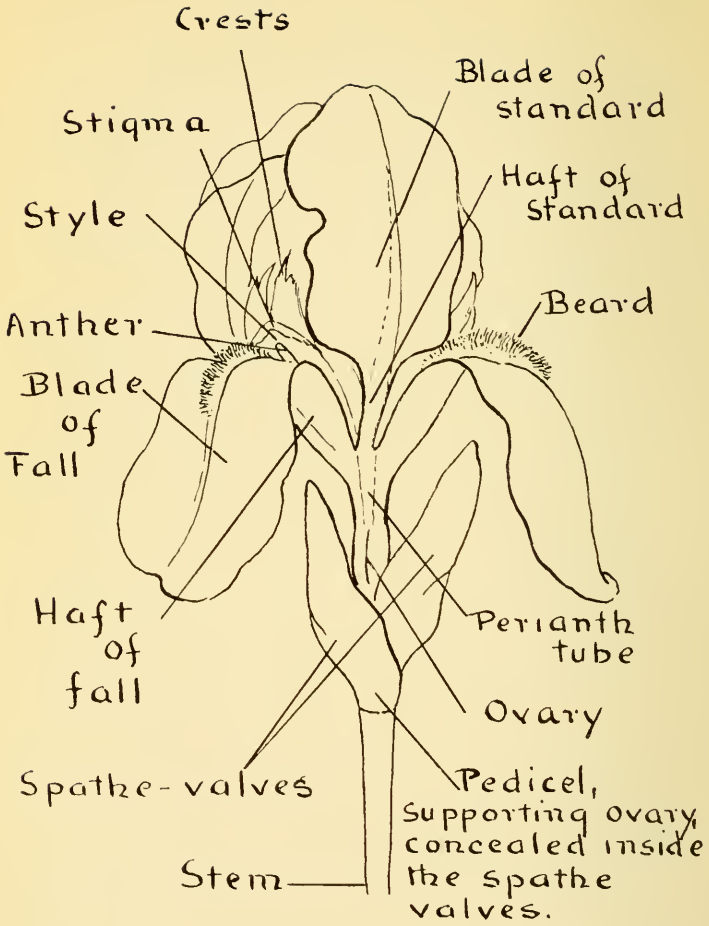

Crests
Blade of standard
Stigma
Haft of standard
Style
Beard
Anther
Blade of Fall
Haft of fall
Perianth tube
Ovary
Spathe-valves
Pedicel, supporting ovary, concealed inside the spathe valves.
Stem

THE IRIS.

I.

The Parts of the Iris Flower and Plant.

An Iris flower consists usually of three outer segments called falls and of three inner segments called standards. The standards are usually about equal in length to the falls, although in a few cases they are reduced in size and become mere points. In the Juno Irises, the standards are much reduced and extend horizontally or even hang down and touch the perianth tube. The lower part of both of the falls and of the standards is usually called the haft and over the haft of each fall arches one of the three branches of the style. Each branch ends in two, more or less divergent, triangular crests and under them is the stigma to which the pollen must be conveyed to fertilise the flower. Under the style branches lie the anthers supported on slender rods, called filaments.

At their base the falls and standards unite to form the perianth tube, which is sometimes merely short and funnel-shaped but which usually extends below this as a straight tube above the ovary. The latter is supported on a short stem called the pedicel and enclosed in the spathe, which has protected the bud until it was almost ready to unfold.

The valves of the spathe may be either dry and papery, in which case they are called scarious or else herbaceous, which means that they retain some moisture in their tissues and are not shrivelled. Herbaceous spathes may be either membranous and semi-transparent or opaque, green or green more or less flushed with dull purple.

The rhizome is really a stem that creeps along the surface of the ground and should therefore never be deeply covered. With the exception of the two species of the Nepalensis section (p. 21) and of I. sisyrinchium (p. 24), all Irises, that are not bulbous, have rhizomes. In the case of the Bearded species, the rhizome is stout and fleshy, but in the Beardless species it is usually much more slender and fibrous.

II.

The various Sections of the Genus and their Distribution.

There is probably no genus of hardy plants that can provide flowers in the garden for as many months of the year as do Irises. Indeed, in a light, warm soil and in favourable seasons in the south-east of England it is by no means impossible to have Irises in bloom in every week in the year. In countries with a continental climate, consisting of hot summers and hard winters, such an ideal would doubtless be unobtainable, though on the other hand, even if the flowering season were compressed within narrower limits it would probably be easier to cultivate successfully many species which are difficult to keep in health in England where the climate is so changeable.

Irises are found growing wild in all parts of the Northern Temperate Zone from California in the West right round the globe to China and Japan. To the north they extend as far as Alaska, Kamchatka and Siberia and to the south to Hong-Kong, Southern Arabia and Florida. In many places they are found growing within a few yards of the sea as for instance in Portugal where I. subbiflora grows on the coast near Coimbra, or in Maine where a form of I. setosa flourishes

within reach of the salt spray, while in China and Tibet they are found at elevations of more than 12,000 feet. No Irises grow wild south of the Equator, for they are there replaced by a closely allied genus, the Moraeas, which are numerous in South Africa and which differ from Irises mainly by the fact that the segments of the flower spring separately from the top of the ovary without first forming a tube of some length as they do in all Irises. Moraeas, moreover, form corms and not bulbs, the difference being that a bulb consists of numerous layers of skins, like those of an onion, while the substance of a corm is uniform and not split up into layers. New corms form like those of a crocus or a gladiolus on top of the old corm, while new bulbs grow alongside the old bulbs and rather from their base than from the apex. It is true that one plant, long known as Iris sisyrinchium, which extends over a vast belt of country from Portugal to Baluchistan, has a corm and not a bulb, but this simply proves that it should more properly be considered a Moraea and not an Iris.

For purposes of classification Irises may conveniently be divided into bulbous and non-bulbous species and among the bulbous species there are at least three well-marked divisions, the Xiphiums, the Junos and the Reticulatas. The Xiphiums, which comprise the so-called English and Spanish Irises, are confined to Spain and Portugal with the neighbouring countries of Southern France and North Africa and are characterized by the shape of their flowers and by the bulbs. These have smooth, and not netted, skins and lose all

their roots during the resting period in Summer (*see* fig. 9, p. 62).

The name of Juno was apparently given to a group of bulbous species merely in order to distinguish it and not because it was in any way peculiarly appropriate. The Juno species are distinguished by the fact that the bulbs in their resting state have attached to their base a number of fleshy tuberous roots (*see* fig. 6, p. 40). They are found near the shores of the Mediterranean, in Asia Minor and Northern Mesopotamia and also in Turkestan and in the Salt Gange on the North-west Frontier of India.

The third section of bulbous Irises is grouped round Iris reticulata, which was so called because its bulb bears a coat of finely netted fibres (*see* fig. 5, p. 27). This section is confined to the region between the Caucasus and the south of Palestine, if we ignore a doubtful species Iris Kolpakowskiana, from a valley in Turkestan. In some ways this species differs widely from the other Reticulata Irises and it is so imperfectly known that it is impossible to assign it with certainty to its proper place in the genus. Its seeds, for instance, are quite unknown, though they would give us at once an indication as to whether it should be classed as a Reticulata Iris, for the seeds of that section are quite characteristic.

The only plant, whose seeds are liable to be taken for those of a Reticulata Iris, is Hermodactylus tuberosus. This is common in Italy and in other parts of Southern Europe and is often known as Iris tuberosa. It received its name from the curious finger-like tubers,

which form its rootstock (*see* fig. 3, p. 6). The flowers are a wonderful combination of green and velvety black and the narrow four-sided leaves are also curiously like those of I. reticulata, though, when mature, they may be distinguished by the fact that they taper slightly upwards from the broad base to the narrow apex, while the leaves of I. reticulata are of the same diameter throughout their whole length. Hermodactylus tuberosus is separated by botanists from the Irises on the ground that the ovary is not separated into three compartments, though they apparently overlook the fact that in Iris pumila the separation is not complete right down to the base of the ovary. In this species, and only in this species, so far as we know, the dividing membrane separates about half way from the top, so that the three compartments of the ripe seed capsule of the true I. pumila open into each other.

The non-bulbous Irises have for their rootstock what is known as a rhizome, which is really a creeping stem. This is capable of infinite extension by means of lateral shoots so that rhizomatous Irises can spread far more easily than the bulbous species. When this creeping stem becomes erect and turns into a flower stem, its growth ceases with the full development of the flowers and the energies of the plant are then diverted into the development of lateral buds. These can usually be found on either side of the rhizome near the base of the tuft of leaves. From them fresh rhizomes soon form and it is from these that the flower stems arise in the following season. If a rhizomatous Iris fails to

To face p. 6.

Rootstock of Hermodactylus tuberosus.

(Natural size).

flower for several years, it may produce a rhizome more than a foot in length. This will be broad and narrow by turns, according as the growth of the leaves was active and luxurious in spring and summer or slow and scanty in autumn and winter.

Two Irises only are known to have neither rhizomes nor bulbs but to consist in their resting state merely of a dormant bud to the base of which are attached a number of fleshy store roots. These are I. nepalensis and I. Collettii of which the rootstocks are not unlike that of a Hemerocallis. These two species differ chiefly in that I. nepalensis possesses a stem some inches in length and a short perianth tube between the flower and the ovary, while in I. Collettii the stem is practically non-existent and the tube several inches in length.

Curiously enough there are other similar pairs of Irises differing from one another in precisely the same way. The Austrian and Hungarian I. pumila has a long tube and practically no stem, while the French I. chamaeiris has a tube much shorter than the stem. In the Balkans I. Reichenbachii corresponds to I. chamaeiris and I. mellita to I. pumila, while the corresponding Himalayan pair are I. kumaonensis and I. Hookeriana. In China the same characters separate the stemless I. Potanini from I. tigridia. It is difficult to see what local conditions can have produced the development of these various pairs of Irises along the same lines, though a better acquaintance with the precise conditions under which they grow in their native habitats might help to solve the problem.

Among rhizomatous Irises the most obvious division is into bearded and beardless species, which are known as Pogoniris and Apogons, from the Greek word πώγων, a beard. Of Bearded Irises there are four well marked and homogeneous sections, while among the beardless species there are a number of small groups of which the members are obviously closely related to one another and a few isolated species, such as foetidissima and setosa.

The comparison of the seeds of the various species shows that, although each section of the Bearded Irises has a characteristic type of seed, the seeds of the individual members of each group are indistinguishable from one another. On the other hand most of the Apogon or Beardless species can be readily recognised by their seeds, for there are many very distinct types among them, and hardly any two species have seeds which are indistinguishable the one from the other.

Of Bearded Irises the chief section consists of the Pogoniris proper, among which are the various species from which the vast majority of our garden Irises have been developed by hybridisation. Species of the Pogoniris section are found growing wild from the Atlantic coast of Portugal and the Atlas mountains of Morocco through Central and Southern Europe and Asia Minor to Turkestan and the mountains of Manchuria, Tibet and Western China. None are found wild in America, for I. albicans in Mexico was doubtless imported from Spain.

Of the three minor sections of Bearded Irises the most fascinating and the most difficult to cultivate

successfully consists of the Oncocyclus species (p. 150) which range through Asia Minor, Syria, the Caucasus and Western Persia. Further east, in Turkestan, are found the Regelias (p. 164) of which the seeds are indistinguishable from those of the Oncocyclus species, but which differ in the formation of their rhizomes, in the fact that their stems bear two or three flowers instead of the solitary bloom of the Oncocyclus and also in being much more amenable to cultivation.

The Regelias are confined to the northern side of the great mountainous backbone of Central Asia while on the southern side there grows in Northern India a small group of somewhat closely allied species, which have been called Pseudoregelia and which are characterized by the possession of a curiously compact and gnarled rhizome and by producing flowers which are mottled and blotched with two shades of purple in a way that is not found in any other section of Irises.

Between the Bearded and the Beardless Irises come the Evansia species, in which the central line of the "falls" or outer segments of the flower is raised into a conspicuous ridge or crest. The species of this section seem strangely reluctant to hybridize either with one another or with the Bearded or the Beardless Irises. One species, I. tectorum, has been combined with bearded species and the flowers of the hybrid bear a beard springing from a distinct, raised ridge. As, however, the hybrids have so far proved quite sterile both to their own pollen, which is imperfect, and to that of their parents, it has been impossible to raise a second generation, which might have thrown

some light on the question of the real relationship of the Bearded and Crested sections.

The Apogons or Beardless species are by far the most widely distributed of all the divisions of the genus and therefore presumably represent an earlier stage in its development than the various bearded sections (*see* p. 15). Beardless species are found all over the temperate regions of Europe, Asia and North America. Moreover, as these species are more widely distributed than those of any other division of the genus, so also do they differ more widely in their habits and requirements. All the Bearded species require dry conditions of soil and situation and so also do the bulbous species with the single exception of the Pyrenean I. xiphioides. It is only among the Apogons that we find some species, such as pseudacorus, versicolor and laevigata, which revel in the moist soil of a bog and others, such as the Californian bracteata and tenax, which will only flourish where the soil is porous and well drained.

A useful indication of the needs of any particular species in the way of moisture is to be found by holding a leaf up to the light. If it appears to be dotted all over with minute black specks, then the plant needs moisture, while, if the green colour is uniform, the plant will flourish in drier conditions. The black specks are produced by the thickening of the tissue to form valves or divisions in the vertical channels that run through the substance of the leaves.

The various sections of the Iris genus may be separated as follows :—

	Rootstock a bulb, a corm, or a rhizome	1.
	Rootstock neither a bulb nor a corm nor a rhizome but merely a bud with a bundle of fleshy roots attached to it.	The Nepalensis Section (p. 21).
1.	Rootstock a corm, of solid substance not arranged in rings; individual flowers lasting a few hours only.	Gynandriris Section (p. 24).
	Rootstock a bulb or a rhizome.	2.
2.	Rootstock a bulb.	3.
	Rootstock a rhizome.	5.
3.	Bulbs with netted coats.	The Reticulata Section (p. 27).
	Bulbs with smooth skins.	4.
4.	Bulbs with fleshy roots attached during the resting period.	The Juno Section (p. 41).
	Bulbs without any roots during the resting period.	The Xiphium Section (p. 62).
5.	Falls bearing a crest like a single cockscomb.	The Evansia Section (p. 78).
	Falls not crested.	6.
6.	Falls not bearded.	7.
	Falls bearded.	8.
7.	Stem branching regularly and forming a raceme.	The Pardanthopsis Section (p. 87).
	Stem not branching regularly.	The Apogon Section (p. 89)

8.	Beard very widely scattered over the haft of the fall, stems 1-flowered; outer leaves curved, sickle shaped. Seeds with circular creamy collar.	The Oncocyclus Section (p. 150).
	Beard linear, confined to a narrow line.	
9.	Falls and standards both bearded; stems never branched, seeds with large circular creamy collar, rhizome spreading by stolons.	The Regelia Section (p. 164).
	Falls alone regularly bearded; seeds without large collar, rhizome not spreading by stolons.	10.
10.	Rhizome compact, gnarled; flowers appearing while leaves are quite short; seeds with small creamy collar.	The Pseudoregelia Section (p. 175).
	Rhizome linear; flowers as tall as or above the full grown leaves; seeds without creamy collar.	The Pogoniris Section (p. 180).

III.

The Geographical Distribution of the various Sections and Species and their relative ages.

Any account of the geographical distribution of the species of a botanical genus should be based, if it is to be accurate, on the examination of a large number of dried specimens of collected plants and not on the statements in books on local floras. These latter are often, and indeed usually, misleading because in most genera there is such confusion among the names that it is impossible to be certain what plant is really recorded under any given name. Accordingly no references will be made here to any local floras and all the statements are based on the herbarium collections of Kew, The British Museum, Edinburgh, Oxford and Cambridge and also on those of Berlin, Vienna and Paris, together with a certain amount of material from Washington and Petrograd.

At first sight the shrivelled remains of a plant, which was collected, roughly pressed and dried on some exploring or scientific expedition, do not seem to afford much help towards its identification but familiarity with a number of such specimens and knowledge of the behaviour of many of the species when cultivated in our gardens lead to a perception of the peculiarities and characteristics of each one, which finally makes it

in nearly every case an easy matter to determine the identity of the specimen. It becomes obvious at a glance to what group or section the plant belongs and the trained eye soon sees the one or more characters which separate each species from its relatives.

Whatever view we take of the exact process by which species have originated, it will probably be agreed that species of which the seeds are indistinguishable are more closely allied to one another and possibly of more recent origin than those of which each can be identified by its characteristic seeds, for the latter would seem to be more probably the remaining representatives of large groups, of which the majority of the members have died out. If, on the other hand, we find groups of species, all of which have seeds of the same type and which are confined to a comparatively small area, there is probably no doubt that these groups are of comparatively recent origin.

If this theory is adopted, then it is obvious that such Irises as the Oncocyclus species, the Regelias and the Pseudoregelias are of much more recent origin than the Apogon or beardless species. All Oncocyclus Irises, and indeed all Regelias as well, have seeds which are indistinguishable from one another and yet recognizable at a glance as differing from those of all other species. The seeds of the Pseudoregelias are of a slightly different type but agree among themselves and differ from all others in the same way.

The distribution of these groups is equally remarkable. Oncocyclus species are only found distributed over a comparatively small area, from Asia Minor to

the Mountains of Western Persia and from the Caucasus region in the north to the Egyptian frontier of Syria in the south. The Regelias are confined to the region between the Caspian Sea and Afghanistan and Beluchistan, while the Pseudoregelias are only found to the east of the Pamirs and of the Hindu Kush on the southern side of the Himalayas.

On the other hand, Bearded Irises of the Pogoniris section are much more widely distributed and are found from the Atlantic Coast of Portugal through Europe and North Africa, Southern Russia, Asia Minor and Arabia to Central Asia, North-West India and Western China, and we may, therefore, look on this section as being older than the Oncocyclus, Regelia and Pseudoregelia sections. By the same arguments we shall conclude that the Pogoniris or Bearded section is younger than the Apogon or Beardless section, of which representatives are found wherever Irises grow at all. No bearded species is a native of America (*see* p. 8) and yet one Apogon at least (I. setosa) is a native both of America and of Asia. The fact that forms of I. setosa are found in Alaska, in Labrador and on the coast of Maine and also in Siberia and Kamchatka seems to show that it must be a species of very ancient origin. Again, I. ensata is one of the most widely distributed of Asiatic Irises and its nearest relatives seem to be the members of the longipetala group, which are found from San Francisco on the Pacific coast to Laramie on the eastern side of the Rocky Mountains. In western Europe our native I. pseudacorus is very widely distributed and its

nearest relative is I. versicolor in the Eastern United States. The view that it is therefore a species, which arose early in the development of the genus, is supported, perhaps, by the fact that all attempts to hybridise it, except with pollen of versicolor, have so far proved futile and even then the one known hybrid is sterile.

Species which combine to produce sterile hybrids are presumably of greater antiquity and less closely related than those which give rise to fertile hybrids, while those which obstinately refuse to allow themselves to be hybridised at all must therefore be looked upon as still more ancient. It is no surprise then to find that there is no known hybrid between an Apogon and a Pogoniris, though various species of Pogoniris cross fairly readily with Oncocyclus and Regelia species. The hybrids thus produced are, however, practically entirely sterile, for there is only one known instance of a second generation arising from such a hybrid and that is a seedling raised from one of Foster's pallida-iberica crosses.

The Evansia or crested Irises are a puzzle but seem to be more nearly related to the Bearded Irises than to the Apogons. The seeds of the Asiatic species, Milesii and tectorum, are intermediate between those of the Pogoniris and Oncocyclus species and it has been found possible to cross the Loppio form of I. Ciengialti with pollen of I. tectorum. The result was a sterile hybrid with a beard on top of a crest and intermediate in other ways between the two parents. There is no sign of dominance, as the term is used in Mendelian

language, and this is apparently the case among Irises whenever two obviously distinct species are crossed. For instance, the bearded I. Boissieri has its beard shorn of half its length when it is crossed with any beardless species of the Xiphion section and the long perianth tube of I. tingitana is reduced to half its length in the hybrid between that species and the tubeless I. xiphium.

Since, however, a Pogoniris will cross with an Evansia, though neither of these has been known to cross with an Apogon, we may conclude that they are later developments in the Iris genus and it is interesting to remember in this connection that in the United States there is an Apogon I. verna, which, except for the absence of a beard, looks exactly like a Pogoniris. Moreover its seeds are very characteristic and resemble no others except those of I. cristata and its subspecies I. lacustris, which represent the Evansia Section in America. Possibly we have here in I. verna and I. cristata specimens of the two diverging groups that are both developing from the original Apogons.

Even the Apogons themselves seem to be throwing off new and closely allied species in two areas. One of these is in California, where we find I. Douglasiana, I. tenax, I. bracteata and others, all of which cross readily with one another and give fertile hybrids and the other is in south-western China, a region from which we have recently obtained several representatives of the Sibirica section, I. Wilsonii, I. Forrestii, I. chrysographes and I. Delavayi. These, again, are readily fertile to each other's pollen and produce

fertile hybrids, though when crossed with the Europaean I. sibirica they give sterile hybrids.

Of rhizomatous Irises it seems therefore that the Beardless species or Apogons represent the oldest types of Iris and that from them have developed the Bearded Pogoniris and the crested Evansias. More recently still the comparatively small, local sections of the Oncocyclus and Regelias species have been developed from the Pogoniris.

There remains the problem of the bulbous species. What was their origin and are they older or younger than the rhizomatous sections? There are at least three distinct bulbous sections, the Xiphions, the Reticulatas and the Junos, each of which is confined to a comparatively small area. The Xiphions are only found in Spain and in its geological extension in Northwest Africa, with the two exceptions of I. xiphium, which has an outlying station near Beziers on the south coast of France and of I. juncea, which grows or grew near Palma in Sicily. The Reticulatas are natives of the Caucasus, Asia Minor, Syria and northern Mesopotamia and are confined to that district, with the single exception of the imperfectly known I. Kolpakowskyana from Turkestan, which by reason of its crocus-like leaves may constitute a distinct section of the genus. The Junos are the most widely distributed of all the Bulbous sections for they extend from the habitat of I. alata and I. palestina round the coasts of the Mediterranean and in Sicily, through Asia Minor, Mesopotamia, Turkestan and Afghanistan to the Salt Range and the neighbourhood of Rawal Pindi in the Punjab.

Curiously enough we can in each of these three cases point to nonbulbous species, natives of the same areas, which seem to show traces of relationship, or of development along similar lines, to the local bulbous species. Thus in Spain, the home of the various Xiphion species, we find I. spuria. The shape of its flowers and of those of I. xiphium is almost identical and both these species share the characteristic that drops of nectar stand out on the short funnel-shaped perianth tube, which lies between the base of the segments of the flower and the top of the linear tube, though this phenomenon is not common in other species.

In Palestine and Syria among the Reticulatas grows the small group of Apogon species, of which I. Grant Duffii is typical. Seedlings of this species by the end of their first season will be found to have formed what are practically bulbs with netted coats similar to those from which I. reticulata took its name. It is only in later years that a short rhizome is formed of a succession of rings, each representing the base of the bulblike apex which develops as the result of each season's growth.

The character, which separates the Juno Irises from all other bulbous species, is the formation at the end of the growing season of thick store roots, which remain unbranched during the season of rest in summer. The characteristic rhizomatous Irises of Asia Minor and Turkestan, the centre of the area of the Juno species, are the Oncocyclus and Regelia sections, which both form stout roots before growth ceases in early summer.

These roots remain unbranched during the summer drought and only send out lateral rootlets after the coming of the autumn rains. They are not so stout nor so fleshy as those of the Juno Irises but they have the property of remaining dormant for an equally long period.

The fact that the three bulbous sections are each confined to comparatively limited areas seems to show that they are relatively late developments in the history of the genus, but it does not seem possible to trace or even to suggest the steps by which they have developed.

Rootstock of I. nepalensis.
(Natural size).

IV.

The Nepalensis Section.

This small section contains, as far as is known, only two species, I. nepalensis and I. Collettii, of which the former has a stem of some length and the latter practically no stem. Moreover, the leaves of I. Collettii are relatively broader than those of I. nepalensis.

The rootstock of these two species is unique. It consists merely of a bundle of about eight or twelve fleshy roots attached to a growing point or bud (*see* fig. 4). These roots are formed at the end of the growing season and are unbranched when growth ceases in October. In this country, at any rate, it is better to lift the plants then and store them in dry sand until the following March, when they should be planted out in a sunny position in well drained rich soil and given plenty of moisture during the growing season. It seems probable that in their native homes, growth ceases in the autumn when the dry north-east monsoon sets in and that the plants are then frozen and remain dormant until the spring, when growth is rapid in the warmth and moisture of the south-west monsoon.

*I. nepalensis.** Don, 1825. The southern slopes of

* It must be carefully distinguished from the I. nepalensis of Wallich, a synonym of the atropurpurea form of germanica which was common in the neighbourhood of Khatmandu in Nepal as early as the beginning of the XIXth Century.

the Himalaya from Garhwal and Kumaon to Nepal, Sikkim and Bhutan. It appears also to extend into Yunnan in South-western China.

This species is rather a botanical curiosity on account of its curious rootstock than a good garden plant (*see* p. 21). The foliage is narrow and strongly ribbed, with one prominent midrib on one face of the leaf and two on the other. It is conspicuously glaucous at the base but becomes greener as it matures. The flowers are very delicate and fugitive, only lasting one day. The fine, deep lavender or lilac veining on a lighter ground stands out on the falls, which have a central yellow ridge tipped with mauve and the spreading standards are wholly of one shade of colour, usually a little darker than that of the falls.

The stem is 12 to 18 inches long and usually bears one or two short lateral branches as well as the terminal head of two flowers. The long narrow spathes are keeled and green and the flowers do not appear until June in this country.

I. nepalensis is easily raised from seeds sown in pots in the open and the plants thus obtained are more perfect than those that are collected, for the latter seldom reach this country with the fleshy roots intact. For cultivation *see* p. 21.

I. Collettii. Hooker, 1903. Burmah, Siam and South-western China. First discovered by Collett on the Shan Hills in Burmah in 1888.

This is practically a stemless form of I. nepalensis, though quite distinct enough to merit specific rank.

The rootstock is very similar, except perhaps that the roots are more inclined to be swollen near the extremity than is the case with I. nepalensis. The flowers are smaller, about 1½ to 2 inches in diameter, of a more uniform lilac colour and less veined. The central ridge is of a very vivid orange and the leaves are relatively broader. It is probably also a characteristic of the foliage that there should be two prominent veins or ribs on one surface of each leaf and three on the other, whereas in I. nepalensis there are two on one surface and one on the other.

The stems, of which several are produced on a strong plant, are only an inch or two in length and the perianth tube is about 1½ inches long.

Cultivation is the same as for I. nepalensis, *see* p. 21.

V.

The Gynandriris Section.

I. sisyrinchium. Linnaeus, 1753. The name is derived from the Greek word σισύρα, a cloak of shaggy goat's skin and was applied to this plant because of the thick covering of coarse fibres which surrounds the corm.

This curious plant is very widely distributed. It is found in Portugal and all round the coasts of the Mediterranean, in Egypt, Syria and Mesopotamia and through Central Asia as far as Afghanistan and the neighbourhood of Quetta and Peshawar.

Strictly speaking it is probably not an Iris at all but a Moraea. At any rate, it is much more closely allied to the bulbous plants of South Africa than to any of the Irises and it is the only exception to the rule that Irises are found to the north of the Equator and Moraeas to the south.

Botanically it differs from the Irises in having a rootstock that is a corm and not a bulb. A bulb is composed of a number of skins or layers, and offsets develop at the base or sides while a corm is of uniform substance throughout, as in the well-known instance of the Crocus or Gladiolus and new corms form on top of the old corm.

However, this plant has been called an Iris since the time of Linnaeus and it may therefore be included in this account of the genus, though it is so distinct that a separate section, Gynandriris, has to be made for it with reference to the fact that the male stamens are closely attached to the female style.

The corms are said to be edible but experience has shown that they will not commend themselves, in the raw state at any rate, to all palates.

The plant itself is very variable and many local forms occur in various parts of the wide area over which it is distributed. The stem may be very short or as much as twelve inches in length but is always shorter than the linear, strongly veined leaves. There is a terminal head of two or more flowers and usually several lateral heads. The spathes are tubular at the base, thin and membranous and one peculiarity is that the flowers do not open until nearly midday and fade away by four or five in the afternoon. Each spathe, however, may produce as many as six flowers in succession, at intervals of a day or two.

The flowers vary in colour and may be of any shade of lavender or lilac. There is usually a patch of white on the blade of the falls which is often dotted with minute spots of the same colour as the edge of the blade. Along the centre of the haft and running on to the blade is a yellow ridge, which is sometimes dotted with black.

I. sisyrinchium demands a thorough ripening in summer, if it is to succeed and flower well. Provided that it gets this, it is not exacting as to soil, though it

is probably most vigorous in a heavy soil, rich in lime. If the corms are lifted when the leaves wither and stored in dry sand in a warm place until October, there is no difficulty in cultivating this plant.

It is by far the most widely and regularly distributed of all Irises and its relationship to the flora of South Africa may be evidence of its great antiquity and of the possibility that it represents an older type of development than we find in any of the true Irises.

To face p. 26.

I. reticulata and bulb.

(Half size).

VI.

The Reticulata Section.

The distinguishing character of the species included in this section is the network of fibres which forms the outer coat of the bulb (*see* fig. 5, p. 26), and it is from this network (Latin *reticulum*, a little net) that the name was derived. The foliage, too, is quite different from that of any other section. In all species it is very narrow and, with two or three exceptions, quadrangular in section with two broader and two narrower faces.

The best known species is I. reticulata itself, a native of the Caucasus, where it was first discovered by Bieberstein over a hundred years ago. A curious fact about this Iris is that the common plant in the Caucasus is a red purple form similar to that which is usually known as the variety Krelagei. Indeed, the origin of the deep violet blue form, so well-known in our gardens, is quite uncertain. All the known examples of it have probably been derived as offsets from one original bulb, either collected or a seedling of garden origin. On several occasions I have received bulbs from the Caucasus and they were always the red-purple form and, what is still more curious, all the seedlings that I have raised from the blue form have always been red purple. It is only in the second generation, as seed-

lings of the red purple form, that I have obtained blue purple seedlings, similar to but not identical with the well-known type. It is possible that this so-called type is really a hybrid between the wild red purple plant of the Caucasus and I. histrio, a blue purple species from Asia Minor.

Whatever its origin, the blue type of I. reticulata is of strong constitution and increases rapidly in congenial soil. Indeed, its tendency to increase by offsets and its reluctance to set seed unless artificially pollinated may be indications of its hybrid origin. Its actual time of flowering varies from year to year. In some seasons it is at its best in February, while in others it is possible to gather buds in the last week of March. In the open garden large masses of it make a wonderful picture with the deep violet blue and the central golden streak set amid the grey green of the narrow leaves. For indoor decoration the buds should be cut by inserting the sharp point of a knife at or just below the ground line and between the two leaves. The buds should then be inserted in bowls of damp sand and it will not be long before they burst open and give off a sweet fragrance which is not always perceptible at lower temperatures in the open.

In northern Asia Minor and particularly in the neighbourhood of Amas, there is found a species with large blue-purple, white-blotched flowers, which appear early in January when the points of the leaves have only just pierced the surface of the soil. This is I. histrioides, so called from the likeness of its flowers to those of I. histrio, a closely allied species from further

south in Asia Minor and possibly in Northern Syria. I. histrio may be in flower in December or not until January but in any case the leaves are some 4 or 6 inches in length when the flowers open. These are very brightly mottled with shades of light and dark blue on a white ground and it was their gaudy appearance that won for the plant the name of histrio, the actor.

Of both these plants there are probably a number of local forms. For instance, the Amas form of histrioides is only the largest flowered form of the same species which was described by Foster as sophenensis from the neighbourhood of Kharput, where it is smaller and much less brilliantly coloured. From Marash, further south, I once received a number of bulbs of "I. histrio," among which there was considerable variation both in the shape of the falls and in the arrangement of the blotches of colour. What was still more remarkable was the presence among them of a few bulbs, which produced flowers of a dull red-purple with a kind of blackish sheen. These were of a darker and blacker red than the Krelagei form of reticulata, but we must obviously expect to find that the flowers of these species may be either blue-purple or red-purple. We must not consider every colour form a distinct species.

I. histrio probably extends into Northern Syria, while further south in Palestine it is replaced by the closely allied I. Vartani, which was discovered by and named after Dr. Vartan of Nazareth. Of this species the flowers are usually a pale lavender grey, though forms are known which are spotted with blue on a

white ground. In a warm place the flowers give off a strong scent of almonds and this fragrance and the very long crests of the style arms alone serve to distinguish the species from I. histrio.

Another ally from the Cicilian Taurus was named Danfordiae, after its discoverer the well-known traveller, Mrs. Danford. I. Danfordiae may be recognized at once by its bright yellow colour and by the fact that its standards are reduced to mere bristles, so small in fact as to be almost invisible. There may be some variation in the size and extent of the band of green or olive brown that runs along the style-branches, but no specimen has yet been discovered of any other colour than yellow.

All these species have four-sided leaves but in Northern Mesopotamia and Kurdistan there is another, I. Bakeriana, whose cylindrical leaves have eight raised ribs set round them at equal intervals. The flowers are small but very brilliantly coloured. The standards are blue-purple and the falls have a deep, velvety dark blue blade, with a central area where the white ground appears flecked with a few dark blotches or spots. It might be supposed that bulbs derived as offsets from a parent bulb would produce flowers identical in every way with those of the parent, but close observation has shown that the offsets do vary a little in the number and exact disposition of the spots and blotches on the white ground, though the general effect of all the individuals is, of course, so similar that the observer at a distance of a few feet would say they were identical. I. Bakeriana hybridises readily with I. reticulata and

the resulting seedlings are remarkable for the velvety brilliance of their colouring. The foliage, too, is interesting, for the leaves are intermediate between those of the two parents and have six ribs instead of either four or eight.

Far away to the East, near Werny, in Turkestan, there has been found an Iris Kolpakowskiana, of which the bulb apparently resembles that of I. reticulata, though the narrow, channelled leaves are more like those of a crocus and quite unlike those of any other member of the section. The flowers are of the same shape as those of I. reticulata but of a fine red-purple colour on a creamy ground, which shows through on the blade of the falls. This Iris is so imperfectly known that a better knowledge of it may make it desirable to constitute a separate section for it.

The reticulata Irises seem to delight in a well-drained soil that is rich in humus and for this reason I. reticulata is often found flourishing in old cottage gardens. I. reticulata and I. histrioides are probably the most successful in this country because their foliage appears later and is therefore less liable to be damaged or even destroyed by severe frost than that of histrio, which develops before Christmas. No plant can ripen a strong vigorous bulb if its foliage is destroyed at an early stage in its development, since the sustenance derived from the soil by the roots must first be modified by the action of light on the green chlorophyll of the leaves before it can be stored up in the new bulbs that form for the succeeding year.

I. Danfordiae and some forms of I. histrio are more

difficult to manage because, when the mother bulb is exhausted by flowering, it does not form, as in I. reticulata, another bulb of flowering size and a few offsets which will grow to flowering size in one or two years, but usually perishes itself and merely leaves behind it a large number of very small bulblets which need careful nursing for a year or two, if they are to grow eventually to flowering size.

The soil for these Irises should not be deficient in lime, which is perhaps best supplied in the form of old mortar rubble. Where they are healthy, they may be left undisturbed for several years, until, in fact, the bulbs become so crowded that there is a danger that they will exhaust the nourishment within reach of their roots. Then they should be lifted, dried off for a few days in an airy place, not too hot nor exposed to the sun and then replanted in fresh soil. Nothing is gained by keeping the bulbs out of the ground after the beginning of September and they should be replanted some three inches below the surface.

If, when the plants appear in early Spring, there are gaps in their ranks, it is as well to lift all the bulbs as soon as the foliage is mature and has turned yellow, because it will probably be found that the bulbs have been attacked by a fungus, which stains the skins black as though with ink. All that are badly infected must be burnt, while the rest should be soaked for about two hours in a weak solution of formalin (one part to 300 of water). They should not be put into the solution immediately they are dug up but only after they have been allowed to dry for a few days.

Otherwise the outer skins will not have hardened and the formalin penetrates too deeply into the bulb with disastrous results. When the bulbs have been treated with the formalin solution, they may be allowed to dry and then be replanted in due course in fresh soil.

All these Irises are well adapted for sheltered sunny corners in the rock garden and also for growing in pots in a cool house. Indeed, they often show to greater advantage in pots in a cold alpine house than in the open, for then their flowers get enough protection from the elements to enable them to last a fortnight or more. No attempt should be made to force the bulbs. They should be potted early in the autumn in rich, well-drained soil and the pots plunged under ashes for some weeks. Then when the shoots appear above the surface, a few days in a cool house will cause the flowers to burst open.

Seedlings are not difficult to raise. The plants should be cross pollinated with the aid of a pair of fine forceps to remove and hold the anthers and then protected from rain by a sheet of glass arranged over them. When the capsules burst open, the seeds will be found to consist of two spheres, of which one is lighter in colour than the other. This lighter sphere will shrivel in a day or two and its contents seem to be absorbed by the other. When the seeds are fully ripened, they should be sown early in the autumn and treated in the same manner as is recommended for seeds of the Juno species on page 48. The young plants should flower in about four years from the time when the seeds are sown.

The various species of the Reticulata Section may be separated as follows :—

	Leaves flat like those of a Crocus.	I. Kolpakowskiana (p. 34).
	Leaves narrow, linear, rod-like.	1.
1.	Leaves with eight ribs at equal intervals.	I. Bakeriana (p. 35).
	Leaves with four ribs and two narrow and two slightly broader sides.	2.
2.	Inner segments (standards) reduced to mere inconspicuous bristles.	I. Danfordiae (p. 36).
	Inner segments conspicuous.	3.
3.	Leaves not yet produced at flowering time.	I. histrioides (p. 37).
	Leaves produced at flowering time.	4.
4.	Style-crests long and narrow ; flowers strongly almond-scented.	I. Vartani (p. 38).
	Style-crests much shorter.	5.
5.	Flowers blue-violet or red-purple, the colour being uniform.	I. reticulata (p. 39).
	Flowers mottled and blotched with two shades of blue-purple.	I. histrio (p. 38).

I. Kolpakowskiana. Regel, 1877. A native of Turkestan in the neighbourhood of Werny and named after General Kolpakowsky, a Russian governor of the province.

Very little is unfortunately known about this curious and very distinct species. It has red-purple flowers not unlike those of I. reticulata (*see* fig. 5, p. 26) and

channelled leaves with thick edges like those of a Crocus. They are about two inches long when the flower appears and the flower is raised above the ground only by the perianth tube which is two or three inches in length.

I. Kolpakoswkiana is apparently difficult to cultivate in this country, for, though it has been introduced more than once into cultivation, it has always died out.

There is said to be a closely allied species, I. Winkleri, Regel, 1884, which differs chiefly in not having its bulbs enclosed in a network of fibres but it is possible that it was described merely from dried specimens, which, having been collected when in flower, had lost the outer covering of the bulbs. At flowering time, the old bulbs are not yet developed. In the same way, I. Danfordiae was first described as a Juno Iris. The dried specimens, collected when the plants were in flower, had lost their outer netted coats and the plant was classified as a Juno because of its minute reduced standards.

I. Bakeriana. Foster, 1889. Named after J. G. Baker, the Keeper of the Kew Herbarium at the time. Native of the hill country near the upper reaches of the Euphrates.

This delightful little species, with brilliant dark velvety flowers, is easily distinguished from all the other members of the section, by the fact that its narrow, tubular leaves have eight longitudinal ribs, set at equal intervals round the circumference. It flowers in February, when the leaves are some four or

six inches long and the flowers reach to the top of the leaves. The colour is a blue violet, becoming very intense and velvety on the blade of the falls, in the centre of which is a small white area flecked with deep violet. The low central ridge is pale yellow along the haft and becomes white on the blade.

There is no great difficulty in cultivating I. Bakeriana in a sheltered sunny corner or in a cold frame, provided that it escapes the fungoid disease, which is always liable to attack the members of the Reticulata section. The bulbs increase slowly by offsets.

I. Bakeriana may be hybridized with I. reticulata and the cross results in a number of different colour forms, all brilliant and intermediate in size between the two parents. The colour of the blade of the falls is always particularly deep and rich.

The leaves of the hybrid are interesting, for they also are intermediate between those of the two parents and have six ribs.

I. Danfordiae. Baker, 1876. Named after Mrs. Danford, who found it growing on the Cicilian Taurus.

This little species grows only to a height of about three inches and is distinguished by its yellow flowers and by the fact that its inner segments are reduced to such small slender bristles that it is often difficult to see them at all. There is often a certain amount of green marking on the style branches and on the blade of the falls. The leaves are very short at flowering time but become eventually about twelve inches in length.

I. Danfordiae produces a number of very small offsets round the base of the flowering bulb. These require careful nursing for a year or two, if they are to develop into flowering size.

All attempts to cross this species with any other have hitherto apparently been in vain.

I. histrioides. Foster, 1892. So-called from its likeness to I. histrio. A native of Northern Asia Minor near Amasia.

This is the large, early-flowering, blue Iris, of which the flowers appear in January when the leaves have hardly pierced the soil. It differs from I. histrio in the shape of the flower, because the falls extend almost horizontally instead of at an angle of 45 degrees as they do in the funnel-shaped flower of I. histrio.

The colour is a bright blue-purple, with a central white area on the blade of the falls, which is blotched and veined with blue. The central ridge is yellow.

The bulbs are large and tend to taper at the upper end, so that they are less rounded than those of I. reticulata. They increase by forming numbers of very small bulblets round the base as well as by offsets of some size.

Owing to the fact that the foliage is late in developing I. histrioides will often go on increasing year after year and do well in some sheltered, sunny bed.

There is a dwarf, small-flowered and rather dull-coloured variety which was described by Foster under the name of sophenensis, from the ancient name, Sophene, of the district round Kharput in which it was found.

I. histrio. Reichenbach, 1872. The name means "actor" in Latin and was given because the flower is so gaily painted. Its home is in Asia Minor.

I. histrio has flowers of the shape of those of I. reticulata and the falls rise at an angle instead of being extended horizontally as in I. histrioides. In most forms the standards tend to curve outwards and the colour is usually a blue-purple, the blade of the falls being blotched with a deeper shade of the same colour with a low yellow central ridge. The species appears to vary a good deal in colour and I once received from the neighbourhood of Marash in south-eastern Asia Minor a variety in which the colour was wholly a blackish red-purple.

Owing to the fact that the leaves of I. histrio begin to grow even before the New Year and are often six or eight inches long in January, they suffer from bad weather. Consequently I. histrio is less easy to cultivate than I. histrioides.

I. Vartani. Foster, 1885. Palestine and particularly in the neighbourhood of Nazareth, whence it was sent to Foster by Dr. Vartan, of Jerusalem.

This species may be looked upon as the southern development of I. histrio. It has the same delicate constitution and, coming as it does from the lower and warmer levels, it sends up its leaves and often its flowers in December and consequently has little chance in this country of ripening good bulbs for the following year.

Its characteristics are the long, narrow style crests, which are actually even longer than the style branches themselves and the strong scent of almonds which the flowers give off.

The colour is usually a rather dull slate-grey but white forms are known and others in which the white is spotted with blue. The flowers stand about four or five inches high and are overtopped by the leaves.

I. reticulata. Bieberstein, 1808. So-called because of the netted outer coat of the bulb (Latin *reticulum*, a little net). It is a native of the Caucasus region.

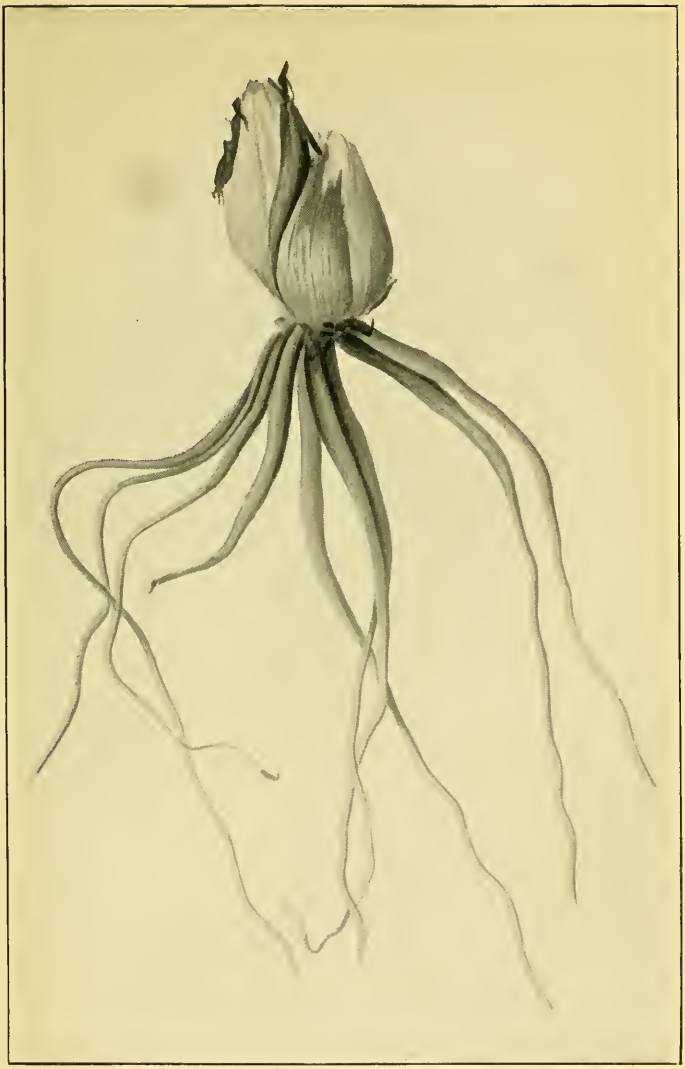
It is a curious fact that, although this Iris has been known in cultivation for over a hundred years and is now very widely distributed, practically nothing is known of it in the wild state. It has already been explained (p. 27) that there is some doubt as to the colour of the typical form and there is also considerable doubt as to the colour of Bieberstein's original type. It is uncertain whether it was reddish purple like the so-called variety Krelagei, or a paler blue than that which is usually cultivated. At various times there have been in cultivation such varieties as cyanea and there is also a light blue variety known as " Cantab."

The narrow leaves usually appear in March and grow to as much as 24 inches in length before they wither away. At flowering time they rise to about eight or ten inches above the ground and so overtop the flowers which are raised on a perianth tube nearly six inches in length. It is not until the seed capsule ripens, that the stem lengthens in order to bring the seeds to the surface.

The erect standards are usually a little longer than the falls, of which the oval blade is separated by a slight constriction from the haft. The central ridge is orange on the blade of the falls and is there surrounded by a white patch blotched with a few dark veins and spots.

The flowers have the scent of violets but the fragrance is only given off in a warm atmosphere.

For hints as to the cultivation of these species *see* pp. 31–33.



A typical Juno bulb.
(Half natural size).

VII.

The Juno Section.

The peculiar formation of the bulbs of the species of this section has already been described on page 5, and the growing plants are quite unlike those of any other section. Of the earliest flowering species the blooms appear when the foliage has hardly or not yet developed above the surface of the ground, but, when the leaves develop, they are more or less deeply channelled and set alternately on either side of the stem, while the flowers develop from the axils of the leaves. This arrangement is very evident in such tall species as I. bucharica with its six or seven flowers arranged alternately with the leaves on either side of the stem (see fig. 7, p. 58), though it is not always obvious in the dwarfer species. The flowers of the Juno species have the peculiarity that the three inner segments, which in other species are usually very prominent and known as the standards, are here reduced to very small dimensions, if not to mere points, and either extend horizontally or even hang down.

The earliest species to flower, especially in the case of freshly imported bulbs, is I. alata which grows abundantly in some parts of eastern Spain, in Sicily and in particular on Mount Etna and in North Africa. The plant is dwarf, with large flowers, usually of some

shade of blue-purple, though pure white specimens are not unknown. The name " alata " was given because the haft of the fall or outer segment of the flower expands into two large wings which fold round and enclose the style branch. A strong bulb of this species should produce two or three flowers in succession and from well ripened bulbs these often appear in November or December, though they may not come until after Christmas.

At the eastern end of the Mediterranean, along the Syrian coast, there grows a closely allied species, palestina. It is a slightly smaller plant than I. alata and the flowers vary very much in shade of colour and may be either blue, green or pale yellow. Botanically, the two species can only be separated by two minute differences. In the first place the stigma of I. alata is divided into two distinct lobes while that of I. palestina is entire and undivided. The other difference can only be seen with the aid of a microscope which shows that the curious processes which project along the centre of the haft of the falls are in I. alata only thickened in the upper part, while in I. palestina they swell out into spheres at their upper ends.

In Asia Minor and north-western Persia there are a number of closely allied species which are usually grouped round the first to be discovered, namely, I. persica. This rare and rather delicate species has beautiful flowers of white and sea green with a conspicuous blotch of brownish purple. Though it was in cultivation in the eighteenth century and formed the subject of the first plate in Curtis' " Botanical

Magazine," yet it is still rare and seldom seen. The reason probably is that the bulbs need a heavy soil in which, in this country, they seldom get sufficiently baked and ripened in summer. Another difficulty is that when these bulbs are grown in heavy soil, it is almost impossible to dig them up with the roots intact, with the result that it is difficult to obtain anything but bulbs already weakened by the loss of their fleshy roots and the consequence is usually failure.

I. persica flowers in February and March and with it come the rather more easily grown I. stenophylla, with flowers of two shades of blue-purple and I. Tauri of a shade of red-purple veined with gold.

All the Juno Irises hitherto mentioned seem to grow wild in that heavy red loam which is found among the rocks in the limestone districts round the Mediterranean. It is a curious fact that plants whose home is in this soil are difficult to keep in good health in this country. It may be that there is some constituent in the soil which is lacking here or it may be that in this country heavy soil is seldom baked so hard and dry for months together in summer as it is in the Mediterranean region. Even if these species are, as a rule, difficult to cultivate, instances are known where, in some sheltered corner, they flourish year after year and, when this is the case, they should be left undisturbed as long as possible.

It is much easier to succeed with several fine species which have been introduced in recent years from Russian Turkestan, where the soil apparently is sandy in many parts. These plants accommodate them-

selves to the conditions in our gardens much more readily and thrive amazingly in warm, light soil enriched with humus or old manure and lime rubble. The earliest of these to flower is I. Rosenbachiana, which can usually be depended upon to throw up its first flowers in the first days of the new year. The probability seems to be that there are really two very similar species. The true I. Rosenbachiana (*see* fig. 8, p. 60), probably the earlier to flower, has golden pollen, a flower either white with a red-purple tip to the fall or wholly red-purple and foliage which is only just developing when the flowers appear, while the other species of which the name is possibly I. baldshuanica or else I. hissarica is rather later to flower, has white pollen and flowers of any shade of blue or red-purple or even of a pale straw yellow, slightly veined with purple. The difficulty of determining the proper name of this species is due to the fact that both I. baldshuanica and I. hissarica were very inadequately described by Russian botanists, dealing only with dried herbarium material. It is not easy to decide whether the early flowers with the golden pollen and the later forms with the white pollen belong to one and the same species, but at any rate the seeds of the two are indistinguishable and quite unlike those of any other iris. There are, undoubtedly, in the mountains of Turkestan, a number of species belonging to the Juno section which can only be properly grouped when brought into cultivation, so that their seeds can be examined and compared.

Among the Juno Irises that we know compara-

tively well there are at least three well-defined groups in which the difference in the seeds coincides with difference in the shape of the flower. Those species which have the broad wings of I. alata have spherical seeds and want heavy soil. Others have cubical seeds and a narrow haft and a large round blade to the fall, while the third type, which is represented in I. Rosenbachiana, has a broad strap-shaped haft and a small narrow blade to the fall and seeds with a conspicuous white excrescence. Of the group with cubical seeds the finest and possibly the easiest to grow is I. bucharica, a tall vigorous species from Bokhara, growing to a height of 18 inches or more and flowering in April with as many as five, six, or seven large flowers of white and deep yellow, set in the axils of the broad, glistening leaves.

Closely allied to this are the deep yellow I. orchioides and the blue-purple I. warleyensis. Of I. orchioides there are pale yellow and pure white forms, while it is quite easy to raise hybrids between any members of this group. A cross between I. bucharica and I. orchioides produces a wholly yellow flower of the size of I. bucharica and a plant at least equally vigorous, while the combination of the yellow of I. bucharica with the purple of I. warleyensis produces a whole series of intermediate forms which may be either yellow slightly tinged with green or brownish purple.

Another fine Juno Iris is I. sindjarensis from the hills of north-western Mesopotamia. The flowers are strongly almond-scented and usually of a light blue-purple, though a white form is also known. This

species belongs to the same group as I. alata and probably needs a heavier soil to do well than I. bucharica and its allies. I. sindjarensis has been combined by Mr. Hoog, of the Haarlem firm of Van Tubergen, with I. persica and its allied forms and has given rise to a series of hybrids which, in some soils, are very vigorous and free flowering. The best of these is probably that which is named Sindpers, of which the flowers are the nearest approach to a turquoise blue which is found in any iris. I. caucasica is an ally of I. sindjarensis, with yellow flowers of a curiously transparent texture, while I. Tubergeniana is another yellow flowered species, distinguished by the possession of a scanty beard.

Beyond the Caspian and in Afghanistan is found a very distinct species, I. Fosteriana, of which the falls are yellow and the comparatively large standards purple. The plant is also distinguished by the deep olive green coats of the bulbs and is by no means easy to cultivate successfully in this country. It was first found by Dr. Aitchison, who accompanied the Afghan Boundary Commission in 1885 and was named after Sir Michael Foster, whose garden at that time contained all obtainable species of Iris.

Another and apparently very desirable species was named after Dr. Aitchison—I. Aitchisoni. Of this the purple form is found on the Salt Range of the Punjaub, while the yellow form is common in the neighbourhood of Rawal Pindi. Unfortunately this Iris has not been in cultivation in this country for many years now and efforts to obtain it have usually

hitherto been unsuccessful. Until it is better known, it is uncertain in which group of the section it should be placed.

I. Willmottiana is one of the most distinguished species of the section and comes probably nearest to I. caucasica. It has very broad leaves of dark green with a curiously polished surface. The flowers are of some shade of blue-purple with distinct white blotches which are rectangular rather than round in outline. Unfortunately this species, which was in cultivation some years ago, has now almost died out, probably because it needs a heavy soil and a thorough ripening which is so difficult to obtain for it in this country.

All Juno Irises should be given a sheltered sunny position, for they flower in winter or in the early months of the year. If the early flowering species are unprotected, the foliage is apt to be damaged and then they are unable to form vigorous bulbs for the next year. When a suitable position is found and the plants are doing well, they can be left undisturbed for three or four years, at the end of which time they should be carefully lifted after the foliage has died entirely away, usually towards the end of June or early in July. When first dug up the fleshy roots are extremely brittle and no attempt should be made to separate the clusters of bulbs. It is better to wait a few days until the dry earth can be pushed out from among them with the aid of a pointed slip of wood and the separate bulbs carefully loosened from the mass and pulled apart, for it will be found that after a few days

the roots are much tougher and less easily broken than when they are first lifted. The bulbs should then be stored in a dry place and replanted early in the autumn, the beginning of September being probably about the best time.

Seeds are fairly easily obtained, especially if the flowers are pollinated by hand, and the ripe capsules contain a large number of seeds. These should be sown early in the autumn in well drained pots of rich soil, made porous by the addition of lime rubble and sunk to the rim in the ground in an open position. The seedlings will begin to appear early in the year at approximately the time when the plants themselves begin to grow above the surface. Immediately the points of the seedlings appear above the surface, the pots should be given the protection of a cold frame. There should be no attempt to coddle them and they should always be given plenty of air. It is merely necessary to keep a sharp look-out for slugs which are very fond of the young shoots and to water the pots occasionally until the foliage shows signs of turning yellow and withering. Then the frame should be permanently covered with a light and the pots kept absolutely dry until the following September, when the light may be removed for three or four months and then replaced when the young bulbs begin to grow. At the end of the second season the bulbs should be sifted out of the dry soil in the pots and planted in September in the open in the positions in which they will begin to flower two years later.

The various species of the Juno Section may be separated as follows :—

I. Flowers with lateral wings to the haft of the falls, which rise above and clasp the style branches. Seeds spherical.

	Stem not apparent; flowers raised above the ground by perianth tube only.	1.
	Stem some inches in height.	2.
1.	Leaves broad with the upper part reflexed. Pollen covered with short spines.	I. alata and I. palestina (*see* pp. 42, 50 and 51).
	Leaves narrow, erect. Pollen covered with a raised network, arranged in pentagons.	I. persica (*see* p. 52).
2.	Flowers with a scanty beard on blade of falls.	I. Tubergeniana (*see* p. 54).
	Flowers not bearded.	3.
3.	Leaves without any distinct horny edge.	I. sindjarensis (*see* p. 54).
	Leaves with a distinct horny edge.	4.
4.	Stem elongated; leaves narrow and set far apart on the stem.	I. Aitchisonii (*see* p. 55).
	Stem short; leaves set closely together so as almost to hide the stem.	5.
5.	Flowers uniform in colour.	6.
	Flowers conspicuously blotched.	I. Willmottiana (*see* p. 56).
6.	Flowers yellow, almost transparent in texture.	I. caucasica (*see* p. 56).
	Flowers purple or lavender.	I. Stocksii (*see* p. 57).

II. Flowers with a narrow haft to the falls, without wings ; seeds cubical, without any conspicuous white ridge.

	Bulbs with dark, olive-green skins ; falls yellow ; standards purple.	I. Fosteriana (*see* p. 57).
	Bulbs with light brown outer skins.	1.
1.	Leaves without any conspicuous horny edge ; flowers a deep golden-yellow, pale yellow or white.	I. orchioides (*see* p. 57).
	Leaves with conspicuous horny edge.	2.
2.	Flowers white with a broad, yellow blade to the falls.	I. bucharica (*see* p. 58).
	Flowers purple with smaller, rounded blade.	I. warleyensis (*see* p. 59).

III. Flowers with an oblong haft to the falls, which is usually slightly wider than the blade ; seeds with a conspicuous white ridge running half round the circumference.

Pollen yellow ; plants early flowering.	I. Rosenbachiana (p. 60).
Pollen white ; plants flowering a little later.	I. baldshuanica (*see* p. 61).

I. alata. Poiret, 1789 ; called "winged" by reason of the large, conspicuous wings to the haft of the falls. Spain, Sardinia, Sicily, Algeria and Tripoli.

This Iris was already known to Clusius in 1576 and grows abundantly in some parts of Spain and on the slopes of Mount Etna. It is not, however, an easy plant to cultivate in this country, chiefly because

imported bulbs usually arrive without their store-roots (*see* fig. 6, p. 40) and, though they may flower the first year, are usually too weak to do well afterwards. Another reason for their failure is that the foliage appears in November and December and is usually so damaged during the winter that no sound, plump bulb is formed for the following year. However, in sheltered sunny corners bulbs do occasionally establish themselves and then flower regularly year after year. In such cases it would be well worth while to cover the bulbs in summer with sheets of glass in order to keep off as much rain as possible and to give them as long and as thorough a rest as our climate will allow.

I. alata has about six pointed, broad, reflexing leaves from the centre of which rise in succession two or three relatively large flowers. The colour is some shade of blue-purple and rarely a pure white. In all cases there is a central orange ridge along the centre of the falls.

I. alata and I. palestina are separated from all other known Irises by the spines which cover their spherical pollen grains.

I. palestina. Boissier, 1884. The coast of Palestine.

This Iris is very closely allied to I. alata and apart from colour, the chief difference is microscopical (*see* p. 42). The stigma also of I. palestina is entire and undivided whereas in I. alata it tends to divide into two lobes. In I. alata the filaments of the anthers are covered with hair-like processes, which do not occur in I. palestina.

The flowers of I. palestina are usually smaller than those of I. alata and are much more variable in colour. They may be either blue, green or yellow. It is a difficult plant to manage for the reasons given under I. alata. When imported bulbs can be obtained in good condition, they are valuable as producing flowers in December and January.

I. persica. Linnaeus, 1753. The mountains of Asia Minor and Northern Persia.

This strikingly beautiful little species was known to Parkinson in 1629 and provided the first plate in the "Botanical Magazine" in 1787 but, as Parkinson found, it is a difficult plant to cultivate and does not flower freely. The reason for this is that it probably demands a heavy soil and a thorough rest in summer. These two conditions are difficult to fulfil in this country and any attempt to lift the bulbs usually results in the loss of the slender, fleshy, store-roots.

The colour is white tinged with pale greenish blue or sea green. There is a conspicuous brownish crimson or purple blotch on the blade of the falls surrounding the end of a raised orange ridge, which runs back along the haft. The leaves of flowering plants are narrow and erect, becoming finally about six inches long. The stem is only an inch or two long.

Besides the plant above described there are in Asia Minor a number of closely allied subspecies which differ chiefly in the colour of the flowers. The differences, which some authors claim to have found in the presence or absence of a white, horny edge to the

leaves, seem not to be constant. The best known of them are :—

1. Var. *Tauri*. Mallet, 1901. From the Taurus Mountains in Cicilia. Flowers deep, reddish-purple veined with white along the haft and on the area round the end of the orange central ridge.

2. Var. *stenophylla*. Haussknecht and Siehe, 1900 (syn. Heldreichii). This narrow leaved variety comes also from the Cicilian Taurus and has flowers blotched with deep velvety blue on a light grey-blue ground. The central ridge is whitish, dotted with dark, purple brown.

3. Var. *Sieheana*. Lynch, 1904. Found by Siehe on the Taurus Mountains. The flowers are blotched with brown-purple on a grey or yellowish ground.

4. Var. *issica*. Siehe, 1905. From the neighbourhood of Issus in Cicilia ; a bright yellow variety.

5. Var. *galatica*. Siehe, 1905. From Galatia near Angora and the river Halys. This is very similar to the variety Sieheana but the wings of the haft of the fall extend horizontally instead of clasping the style branches.

6. Var. *Isaacsoni*. Foster, 1892. Came from Southern Persia. The colour was a creamy white, tinged with green and there was no conspicuous blotch of deeper colour nor any well developed central ridge. This variety has never been reintroduced into cultivation.

7. Var. *purpurea*. Siehe, 1905. From the neighbourhood of Erzinghan, in Armenia. This has flowers of a reddish-purple colour, which becomes darker

on the blade of the falls. This was the plant that Mr. C. G. van Tubergen crossed with I. sindjarensis to produce the hybrids Sindpur and Pursind, with flowers of an unusual amethyst shade of colour.

I. Tubergeniana. Foster, 1899. From the neighbourhood of Tashkent, in Turkestan.

This species seems to be no longer in cultivation. It has bright yellow flowers, of a somewhat transparent texture, and is distinguished from all other Juno Irises by the fact that the central ridge of the falls breaks up into a few straggling hairs on the blade.

The stem is not more than about four or six inches long and bears three or four flowers in the axils of the uppermost leaves.

I. Tubergeniana is probably the plant that was originally described as I. caucasica var. major turkestanica.

I. sindjarensis. Boissier, 1884. From Djebel Sindjar, in northern Mesopotamia.

This is, at its best, a fine, sturdy Iris with comparatively large pale blue flowers, which are strongly scented, with a fragrance resembling that of almonds or vanilla. The texture of the flowers is somewhat delicate and, as the flowers appear in February and March, they need a sheltered position. The stem is six to nine inches high and the leaves eight to ten inches long by 1½ to two inches wide at the base. From three to six flowers are borne in the axils of the leaves. The wings of the falls are very large and meet over

the style-branches. There is considerable variation in the shape of the blade of the falls, which is sometimes very small, though in the best forms it is large and reflexed. The central ridge is a pale yellow. A pure white variety was in cultivation some years ago but it is uncertain whether this was identical with the plant described as I. assyriaca. I. fumosa (Boissier and Haussknecht, 1877) seems only to have differed from I. sindjarensis in the smoky-yellow colour of its flowers and in that case could only be looked upon as a variety of it.

The hybrid between I. sindjarensis and I. persica, raised by Mr. C. G. van Tubergen is a most beautiful plant, especially when grown under glass. It flowered with me in a cold frame for some years and the flowers were of a wonderful turquoise-blue colour. In more recent years I have seen examples of this hybrid, which were certainly of a duller colour, though I have been unable to ascertain whether the change in colour was due to a difference of soil or whether there is more than one variety of this hybrid.

I. Aitchisonii. Baker, 1875. Named after Dr. Aitchison who discovered the plant near Rawal Pindi.

This is a tall, slender Iris, growing as much as two feet in height, the leaves and the flowers in their axils being widely separated on the stem and not crowded together as in many other Juno species. The rather small triangular blade of the fall is of a darker shade than the rest of the flower, which is either yellow or purple, the former being found in the Park at Rawal Pindi and the latter on the Marqullah Pass.

It is quite possible that there are other allied species along the North-west Frontier of India and it is a pity that few attempts have been made to bring them into cultivation in this country.

I. Willmottiana. Foster, 1901. Named after Miss Ellen Willmott, the well-known garden amateur, who had a share in the expedition, which first discovered the plant near Tashkent.

This species is remarkable for its broad, dark green leaves which expand so widely that they hardly appear to be channelled when fully developed. The wings on the haft of the falls are small compared with those of I. sindjarensis. The stem is about six or eight inches long and usually bears three or four or even six flowers. The colour is a blue-purple and on the blade there is a conspicuous white patch, blotched and veined with a deeper shade. It probably needs a rich, rather strong soil, for it is never vigorous in sand.

I. caucasica. Hoffman, 1808. This is apparently the only Juno species found as far north as the Caucasus.

There it is a small species with stiff, bright, glossy green leaves and only one or two or, at most, three flowers of a peculiar transparent greenish yellow. The central yellow or orange ridge on the falls is jagged and tends to split up almost into hairs. Farther south, in Asia Minor, larger forms have been discovered but their relationship to the type is not quite certain. The wings of the falls are very variable in size and in some cases only very slightly developed.

I. Stocksii. Boissier, 1884. Named after Stocks who first collected the plant near Quetta in Beluchistan. It has never been in cultivation but is apparently very similar to I. caucasica except that the flowers are lilac or purple.

I. Fosteriana. Aitchison and Baker, 1887. Named after Sir Michael Foster and a very distinct species, by reason of the strange contrast between the large drooping purple " standards " and the yellow falls. It has a slender bulb with characteristic olive green coats. The stem is about six or eight inches long and bears only one or two flowers. The leaves are strongly ribbed on the under surface and are narrow and taper gradually to a point.

I. Fosteriana is difficult to keep in this country. It probably needs a fertile, rather strong loam and a long period of absolute drought in summer.

I. orchioides. Carrière, 1880. A native of Eastern Bokhara, it owes its name to the resemblance of its flowers to those of an orchid. The flowers are comparatively small, narrow and of no great substance. The colour is either a deep golden-yellow, a pale lemon-yellow or white with a few green veins along the haft of the falls. In the yellow-flowered forms there is usually a green, brown or olive blotch at either side of the front end of the raised central crest.

The flowers, to the number of three or four, are produced singly in the axils of the uppermost leaves.

The perianth tube is nearly two inches long and the " standards " or inner segments of the perianth either extend horizontally or droop downwards.

When this Iris was first discovered, it was confused with I. caucasica but it is distinguished by the absence of any wings to the haft of the falls and by the cubical and not spherical seeds.

I. orchioides hybridizes freely with I. bucharica and the result is a large-flowered variety of a deep golden colour throughout.

For hints on cultivation *see* I. bucharica.

I. bucharica. Foster, 1902. A native of Bokhara.

This fine species is very difficult to separate by any morphological characters from I. orchioides, except perhaps by the fact that the horny edge to the leaves is more marked and conspicuous in I. bucharica. As garden plants, the two are very different, I. bucharica being much more vigorous and floriferous. The bulbs are larger and stouter, the flowers are more numerous, for a strong specimen will bear as many as seven in the axils of the leaves and the individual flowers are larger with a much broader blade to the falls. The colour is white except for the blade of the falls which is a bright, clear yellow, sometimes marked with a few dark blotches near the end of the raised central crest.

The stem is between a foot and eighteen inches in height and the largest leaves nearly twelve inches long by two or more in breadth (*see* fig. 8, p. 58).

I. bucharica flowers in April and is perfectly hardy, at any rate in Surrey. The bulbs increase rapidly in

To face p. 58.

I. bucharica, a typical Juno Iris

(Half natural size).

a sandy soil well enriched with humus and containing some lime. They need only be lifted every three or four years when the bulbs have become crowded (*see* also p. 47).

I. warleyensis. Foster, 1902. A native of Bokhara and named after Miss Willmott's garden at Great Warley in Essex.

This species is obviously closely allied both to I. orchioides and to I. bucharica. It differs chiefly in the very conspicuous white horny edge to the leaves and in its brilliant purple colour. The blade of the falls is of a deep velvety violet-purple, often edged with a narrow white line. The central crest is white and surrounding its outer end there is usually, but not always, a patch of bright orange. The stem is about a foot or eighteen inches in height and bears from three to five flowers.

Seedlings have appeared in cultivation in which the flowers are either white with yellow blotches on the blade of the falls or wholly yellow. In the latter case the plant differs chiefly from I. orchioides in the possession of a rounded blade, which narrows abruptly to the haft of the falls instead of the narrow, almost oblong fall blade of I. orchioides. I am unable to say whether these white and yellow forms are merely colour mutations from the typical purple form or whether they are the result of hybridizations with some other species. Crosses between I. warleyensis and I. bucharica are usually vigorous plants of the shape and stature of the latter with a certain amount

of dull purple or greenish marking on the falls, where the yellow of bucharica contends with the violet of warleyensis.

I. Rosenbachiana. Regel, 1884. The name is derived from that of the Russian governor of Turkestan at the time when the plant was first discovered by Albert Regel and sent to his father at Petrograd.

This is one of the most brilliant of all Irises. Early in the new year there appear broad nipple-shaped shoots covered with membranous whitish sheaths. A few days later the tips of the leaves burst through these sheaths and then the flowers shoot up on a perianth tube, which increases rapidly in length up to four or five inches. Two or three flowers appear in succession from a strong bulb and are very variable in colour. The broad strap-shaped haft of the falls ends in a somewhat narrow blade which bears a very conspicuous golden crest. The colour of the blade is a brilliant dark crimson-purple and the rest of the flower is either white or faint purple. The " standards " are large for a Juno Iris and usually hang down round the perianth tube. The pollen is golden and this, together with the habit of flowering early before the leaves have developed, is the chief point of difference between I. Rosenbachiana and I. baldshuanica. After the flowering time, the leaves grow rapidly until they are nearly a foot long by two inches wide. If pollinated by hand, the flowers set seed abundantly and the young bulbs should begin to flower four or five years later.

All attempts to cross this species with any other

I. Rosenbachiana.
(Natural size).

except I. baldschuanica have apparently failed hitherto and this evidence seems to prove that they form a very distinct subsection. This view is supported by the seeds which are very characteristic, with the creamy white ridge that runs half way round their circumference.

For the method of raising seedlings, *see* p. 48.

I. baldshuanica. Fedtschenko, 1909. From the province of Baldshuan, in Russian Turkestan.

This species differs from I. Rosenbachiana by having white pollen and by flowering a few weeks later, in fact, not until the leaves are a few inches in length. The shape of the flowers is identical with those of I. Rosenbachiana but the colour is very variable and may be of any shade of blue- or red-purple. The central crest is sometimes orange and sometimes lemon-yellow. In some forms the purple colour is reduced to a few veins on a pale ground.

VIII.

The Xiphium Section.

Some botanists have used the word Xiphion to include all bulbous Irises, to whose bulbs no persistent fleshy roots remain attached in their resting period, but the Xiphium and the Reticulata section are so clearly distinct that it seems better to separate them under two names. The word itself is the diminutive of the Greek word for a sword (ξίφος) which was applied by Theophrastus to Gladiolus segetum, a common weed of Greek cornfields. The leaf of the gladiolus may be not inappropriately described as swordlike, for it has a long, narrow pointed blade with a raised or thickened midrib. This description, however, does not apply to either the Xiphium or the Reticulata Irises. The leaves of the former are narrow and channelled and end in a fine round point while those of the latter are four-sided.

The name Xiphium was adopted by Linnaeus but curiously enough he included under it the two plants, which are now known as the English and the Spanish Iris. They are, however, very distinct, quite easy to separate from each other and so different in their requirements that, if the soil of a garden is suited to one of them, the other will be a failure unless special precautions are taken.

To face p. 62.

A bulb of I. tingitana,

showing method of increase by offsets.

(Natural size).

I. xiphium prefers ground that becomes dry in summer and it needs a resting period of drought if it is to do well. Its home is in Spain, in North Africa, and in a few isolated and outlying localities in the south of France. I. xiphioides, on the other hand, the so-called English Iris, comes from the alpine meadows of the Pyrenees, where the underground moisture is never far from the surface. In this country it needs cool, moist conditions and is never happy in hot sandy soil, in which I. xiphium flourishes.

The best botanist and gardener of the latter half of the sixteenth century was probably Clusius, whose books on the plants of Spain and Central Europe are full of first hand observations, which show that they were not merely compilations from other sources. Clusius knew the difference between I. xiphium and I. xiphioides, for he remarks of the latter that the seeds rattle when the ripe capsules are shaken. At first apparently he knew only I. xiphium and then heard of I. xiphioides as growing near Bristol, whence it was subsequently sent to him. In those days Bristol was an important centre for the trade with Spain and some bulbs were apparently brought from the Pyrenees and planted in gardens in the town and it is to this fact that the plant owes its common name of the English Iris.

These two Irises soon gave rise in cultivation to many garden varieties, as plants usually do when raised repeatedly from seeds, and they had become comparatively common garden plants in this country by the beginning of the eighteenth century. In spite

of this fact Linnaeus seems to have confused the two species. The obvious points of difference between them are the larger bulb of xiphioides, the shape of the segments of the flower and the fact that no yellow varieties of xiphioides have ever been known to occur.

The difference in the cultural requirements of the two species has already been noticed, while in the actual flowers the points of difference are the tube which in I. xiphioides separates the ovary from the base of the segments and the broad wings of the haft of the falls, which rise above the style-branches. The standards, too, of I. xiphioides are broad and rounded, while those of I. xiphium are comparatively narrow and taper to a point. The ripe capsules, also, are very different. That of I. xiphium is long and narrow with cubical or rather thick D-shaped seeds, while that of I. xiphioides is much more inflated, wider at the middle and tapering to either end and contains much larger spherical seeds.

In the wild state I. xiphioides does not appear to vary much in colour, but is nearly always a deep blue with an occasional white form. In cultivation, however, many colour forms have arisen until there are varieties of almost every shade of blue and red-purple. A curious fact is that, though, when the seedlings first flower, the colours are uniform, they subsequently become streaked and flecked with deeper shades, as also happens with cultivated varieties of Tulip and Freesia. This is not improbably due to some kind of disease, which is conveyed from bulb to bulb by green or grey flies, which settle on them when they are

stored and lifted in summer. For a selection of varieties, *see* p. 70. They differ from each other only in colour and there seems to be no variation in size, shape or habit.

I. xiphium, on the other hand, has given rise to a very large number of garden varieties, which differ in size and time of flowering as well as in colour. This is, no doubt, partly due to the fact that in nature large early flowering forms are found growing in lower and warmer localities, while high up on the mountains forms are found with small flowers, which do not open until August or even September. Moreover, though most of the wild plants are of some shade of blue- or slate-purple, yellow flowers are not unknown, especially in Portugal near Lisbon and Cintra, whence they have been described as I. lusitanica. The cross fertilisation of the blue and yellow forms and the use of wild forms from various localities have produced endless variation.

In recent years a set of new varieties has been introduced into commerce under the name of Dutch Irises, so-called from the fact that they were raised by Mr. Hoog in the gardens of the well-known Haarlem firm of C. G. van Tubergen, junr. When these first appeared they were said to be hybrids of various species of the Xiphium section, though there was no internal evidence of this. Subsequently, however, some blue-purple varieties appeared, which clearly showed the influence of I. tingitana, both in the shape of the falls and in the presence of a tube between the ovary and the base of the segments. A further confusion had

arisen because they were raised by using as a seed parent a plant, which was known as I. filifolia though it has nothing whatever to do with the true species of that name and is merely an early flowering, vigorous form of I. xiphium.

The fact is that I. xiphium stands quite alone in the section by reason of the absence of any linear tube between the ovary and the segments of the flower. There is the short, broad, funnel-shaped tube from which spring the standards and the falls and this also occurs in all the other species of the section, though in every case it is separated from the ovary by a slender, linear tube. When I. xiphium is crossed with any other species of the section, its effect is to shorten this linear tube to half its length in the other species and good examples of this can be found in two or three of the varieties of Dutch Irises. For a list of varieties *see* p. 73.

Among the other species of the Xiphium section the best known is I. tingitana, which, as its name implies, comes from Tangiers. It has large blue-purple flowers with a central yellow line on the pointed falls and it has the advantage and disadvantage of flowering very early. It is an advantage in that the bulbs can be induced to flower very early under glass without forcing them unduly, while it is a disadvantage because, when the flower buds appear in April in the open, they are apt to be caught and killed by late frosts. The Dutch varieties escape this fate by not flowering as a rule till after the 20th of May and the Spanish Irises are even later and their flowers rarely open until the early days of June.

As might be expected of a native of Tangiers, I. tingitana needs a very thorough ripening in summer, if it is to flower well. In this country this can only be obtained by artificial means and the bulbs should be lifted as soon as the foliage begins to turn yellow in July or August and stored in dry sand in a warm place until November, when they should be replanted in a sheltered sunny position in light soil, well enriched with humus and not deficient in lime. For forcing under glass imported bulbs are used and they are probably grown in the south of France where they obtain naturally the essential ripening.

North Africa is the home of I. filifolia, though the plant is found also in the south of Spain near Ronda and on the rock of Gibraltar. It grows about a foot or fifteen inches high and is distinguished by its rich, red-purple colour with a central orange blotch, usually surrounded by a curious bluish halo. It is a pity that this fine species seems delicate in its constitution, though I am not satisfied that this is really the reason why it died out, some years after I had successfully raised it in large numbers from imported seeds. I am inclined to think that it fell a victim rather to an attack of some disease, with which all my Xiphium Irises became infected.

The other species of the section are the golden-yellow I. juncea from Sicily and North Africa, I. Boissieri from the Serra de Gerez, in Portugal, and I. Fontanesii from Algeria. With regard to the last named there is some uncertainty. Some years ago, when I had an opportunity of examining in the Paris herbarium, the

dried specimens on which Grenier and Godron based their description, I felt justified in thinking that they were merely examples of I. tingitana. Since then, however, I have seen living specimens of a light blue-flowered species, which closely resembles I. xiphium except in the possession of a linear perianth tube between the ovary and the base of the segments of the flower. This plant is, I now think, distinct from I. tingitana from which it differs by its more slender habit and by the small, rounded blade to the falls, which in I. tingitana are large and pointed. It is to be hoped that before long specimens of the two plants will be grown side by side so that it may be possible to decide with certainty whether I. Fontanesii deserves to rank as a distinct species or merely as a slender local form of I. tingitana.

Key to the species of the Xiphium section.

	Falls with a short, broad triangular haft and a large circular blade.	I. xiphioides (p. 69).
	Falls with a long, oval haft separated from the blade by a narrow neck.	1.
1.	Perianth tube short, funnel-shaped, broad.	I. xiphium (p. 71).
	Perianth tube at least ½in. long, linear, slender.	2.
2.	Bulbs with a hard, leathery skin.	I. juncea (p. 73).
	Bulbs with a thin, membranous skin.	3.

I. xiphioides, the "English" Iris.

(Two-thirds natural size).

3.	Falls bearded.	I. Boissieri (p. 74).
	Falls not bearded.	4.
4.	Standards broad and rounded at the top.	I. filifolia (p. 75).
	Standards pointed at the top.	5.
5.	Falls pointed, plant large and robust.	I. tingitana (p. 76).
	Falls rounded, plant slender.	I. Fontanesii (p. 77).

I. xiphioides. Ehrhart, 1792. The Pyrenees.

This species is sometimes known as I. anglica, the English Iris, a name which doubtless originated in the fact that in the latter half of the sixteenth century it was already in cultivation near Bristol. It was there that Clusius first heard of it and included it in his "History of Spanish Plants" because he rightly imagined that it had been brought to Bristol from the neighbourhood of the Pyrenees.

Its real home is in the Alpine pastures, where there is always moisture beneath the surface of the soil and this fact must be remembered in cultivating this Iris, for it will not succeed in hot and dry situations. It needs a cool moist soil.

The deeply channelled, tapering leaves grow to a length of twelve or eighteen inches and the stem is somewhat shorter. It bears only a terminal head of two or three flowers. The spathes are keeled, three or four inches in length, and the ovary is raised on a pedicel one to three inches long and separated from the base of the flower by a perianth tube of quarter to half-an-inch.

The falls have a broad rounded blade and conspicuous wings to the haft which rise above the style branch on either side. The standards are much shorter than the falls and have a rounded blade.

In the wild state the colour is usually a deep blue-purple, though albino forms are not unknown. In cultivation a wide range of colour variations has appeared from the deep blue of the wild plant through lighter and slatey shades to mauve and white. The streaks and flecks which disfigure many of these Irises in our gardens are probably due to a disease, which is spread by white or grey flies, which attach themselves to the bulbs when they are out of the ground during the resting season. The nature of the disease is still obscure and the only escape from it seems to be to raise seedlings and to protect the bulbs from insect attacks whenever they are lifted. They need not be lifted more than once every two or three years and should then be stored in dry sand or closed paper bags with Naphthaline until they can be replanted.

I. xiphioides is the only species of the Xiphium section, of which the shoots do not appear above the ground until the new year. It is therefore extremely hardy.

Good garden varieties are :—

White : Mont Blanc and Mer de Glace.
Deep Blue : King of the Blues, Othello.
Red-Purple : Beethoven, Thackeray, P. C. Hooft.
Light Blue : Bleu celeste, Tantalus.

I. xiphium. Linnaeus, 1753. Spain, Portugal and North Africa.

The name *ξίφιον* seems to have been used by Theophrastus for the plant which we now know as Gladiolus segetum and it is uncertain how it came to be transferred from a plant with the flat swordlike leaves of the Gladiolus to the narrow, pointed, channelled leaves of I. xiphium, the Spanish Iris.

Linnaeus appears not to have drawn any clear distinction between I. xiphium and I. xiphioides, though Clusius had already pointed out the difference in his " History of Spanish Plants " (1576) by noting that the ripe seeds rattle when the capsules of I. xiphioides are shaken. This is impossible in the narrow capsules of I. xiphium.

In wild specimens of this Iris the small round blade of the fall is separated by a sharp constriction from the long oval haft and the standards are rather narrow and pointed. This is the only species of the section in which there is no linear perianth tube between the ovary and the segments of the flower. They are only separated by a short, broad funnel-shaped tube on to the surface of which drops of nectar exude, as in I. spuria. Somehow or other the presence of this nectar is noticed by ants which sometimes swarm up the stems in search of it.

The colour of the flowers of wild plants is usually a blue-purple or a pale slate-blue. At low levels the flowers are large on strong vigorous plants which bloom in April, while high up on the mountains the plants are slender with small flowers, which do not

appear until August or later. I. xiphium is found distributed all over Spain. It also occurs on the coast of Herault in the south of France and in Algeria. Yellow flowered forms, to which the name of I. lusitanica has been given, occur in Portugal near Cintra and Lisbon, but colour alone would not justify us in regarding them as constituting a separate and distinct species.

In recent years a large and early flowering form, which is best distinguished as I. xiphium praecox, has been hybridized with various garden varieties and produced the majority of what are known as the Dutch Irises (*see* p. 65). This I. xiphium praecox was known to the trade growers as I. filifolia (*see* p. 75), but it is readily distinguished from that species by the absence of any linear perianth tube between the funnel-shaped base of the segments of the flower and the top of the ovary. This difference will be appreciated if the figure of I. juncea (p. 74), which has the linear perianth tube, is compared with that of I. xiphium (p. 72), where the ovary protrudes from the spathes and comes immediately below the broad base of the petals.

There is no difficulty in the cultivation of I. xiphium provided that the soil is well drained and warm. Where rainfall is heavy, it would probably be desirable to lift the bulbs when the foliage turns yellow in July and August and store them in dry sand in a warm place until the beginning of October. This will ensure the proper ripening of the bulbs and it will also be found that bulbs so ripened start into growth later and so escape to some extent the danger of damage

To face p. 72.

I. xiphium, the Spanish Iris.

(Slightly reduced).

from hard frost in winter. If the soil is deficient in lime, it should be added in the form of old mortar rubble or powdered chalk.

Some of the best of the older Spanish Irises are :—

White : British Queen, King of the Whites, praecox alba, Queen Wilhelmina.

Yellow : Belle Chinoise, Cajanus, Leander, lusitanica, Walter T. Ware.

Blue : Excelsior (very tall), King of the Blues, praecox.

Pale Blue : Souvenir, Sweet Lavender.

Bronze : Thunderbolt, Reconnaissance, Hercules.

These all flower in the first half of June.

Of the Dutch Irises, which begin to flower towards the end of May, good varieties are :—

Yellow : Van der Helst, Jan de Bray.

White and Yellow : Van Everdingen, Albert Cuyp.

Blue : Rembrandt, Anton Mauve.

I. juncea. Poiret, 1789. This Iris is so-called from its narrow, rushlike leaves. North Africa, Sicily and possibly the Italian Riviera.

This species is not as well-known in cultivation as it deserves to be, probably because its bulbs do not multiply very rapidly by offsets, though they set seed very easily and seedlings are not difficult to raise.

The bulbs are quite characteristic with hard, shell-like outer coats, which split at the apex into a number of stiff bristles. The leaves are slender and as much as 24 inches in length when full grown and the stem, which usually bears two flowers, is about a foot in

height. The slender perianth tube is one to two inches long. The colour of the flowers is usually of a deep golden yellow, though the texture is somewhat thin and flimsy. The blade of the falls is large and almost circular while the standards are comparatively short and tend to spread outwards instead of standing erect.

Some pale yellow forms from North Africa have been named numidica and Mermieri but they were merely colour forms of the species. Unless the position in which this Iris is grown is exceptionally warm and dry in summer, the bulbs should be lifted when the foliage turns yellow, stored in dry sand in a warm place and not replanted until late in October.

I. Boissieri. Henriques, 1885. Named apparently out of compliment to Boissier, the Swiss botanist. Found only on the Serra de Gerez in Portugal, at a height of 2,000 to 3,000 feet above sea level.

This Iris is remarkable for its beard of thin, scattered yellow hairs and for its brilliant colouring. The falls are of blue-purple, the style branches red-purple and the standards blue-purple above and red-purple at the base.

The foliage is slender and overtops the stem which is about a foot or rather less in height. The slender perianth tube is one-and-a-half to two inches in length.

This species seems to be the most tender of all the Xiphium Irises, for it has been killed outright in winters of no exceptional severity. The bulbs should, in any case, be lifted annually as is advised for I. juncea and replanted as late as possible. This means that they

I. juncea.

(Two-thirds natural size).

should be kept out of the ground so long as they remain plump and dormant but they must, of course, be replanted when they show signs of making growth. The position should be sunny and sheltered and the bulbs seem to require a fair amount of moisture when growth is rapid in the spring. The flowers appear early in June.

I. filifolia. Boissier, 1839—45. So-called on account of its narrow foliage. The south of Spain and North Africa.

This is one of the finest and most richly coloured of the Xiphium Irises and it is a pity that it is so little known, chiefly because the trade growers have for years supplied in its place an early flowering, robust variety of I. xiphium.

Bulbs from the south of Spain have flowers of a rich, red-purple with a broad orange blotch on the falls. Round this blotch there is usually a halo of blue. The perianth tube is long and slender and the standards are broad and rounded at the top, not pointed as in I. tingitana and I. Fontanesii. A blue form appears also to be found in North Africa.

The foliage is slender, about 12 to 18 inches long in the case of flowering bulbs but considerably longer when no flower stem is produced.

For some years I had no difficulty in cultivating this species, of which I received both bulbs and seeds from Gibraltar. Eventually they succumbed to a disease, which I was unable to identify. It was, however, equally fatal to the most robust Spanish and Dutch

Irises and I see no reason why we should not succeed in growing this fine species, if a fresh supply of bulbs or seeds could be obtained. It would probably be safer to lift the bulbs annually.

I. tingitana. Boissier and Reuter, 1852. The neighbourhood of Tangiers, from which it obtains its name.

This is the largest and finest of all the Xiphium section but it needs great heat to ripen the bulbs and, though they grow well and increase rapidly, it is only in exceptionally favourable seasons that they are induced to flower. Even then the flowers appear so early in May that there is always a risk that the buds will be destroyed or crippled by late frost in April. In the south of France, of course, this species succeeds magnificently and in recent years bulbs imported from the south have been grown under glass in this country with considerable success. Unfortunately these bulbs are only too often infected with a disease, which spoils the clear colour of the flowers and makes them streaky and mottled. The foliage, too, is yellow in patches instead of a uniform glaucous green. The disease has not yet been determined and no remedy is known.

The stem is 18 to 24 inches long, overtopped by the sturdy foliage and bears two flowers. Of the falls the haft is purplish but the large blade is of a light blue with a central ridge of deep orange-yellow. The blade is not circular but tapers to a point as do also the light blue-purple standards. The perianth tube is nearly two inches in length in a well-grown specimen

and its influence is so strong in hybrids that, when I. tingitana is crossed with I. xiphium, the resulting seedlings all possess a tube nearly an inch in length.

I. Fontanesii. Grenier and Godron, 1852. Named out of compliment to Desfontaines, who first collected specimens in Morocco.

This species has been wrongly identified with I. tingitana. It resembles a slender growing form of that species and agrees with it in possessing a linear perianth tube and tapering, pointed standards. The colour of the specimens, which I have seen, was a clear light blue with a central band of yellow on the rounded blade of the falls.

Exceptionally vigorous and well-grown specimens of I. xiphium and of I. tingitana will occasionally produce a flower on a short, upright, lateral branch a few inches below the terminal head of flowers and the effect produced is then very similar to that of I. spuria (*see* also p. 19).

IX.

The Evansia Section.

This small group of some eight species is distinguished by the linear crest like a single cock's comb, which replaces the beard in Pogoniris. It was named in 1812 after one Thomas Evans of the India House and Stepney, in what is now the East End of London, in recognition of the fact that he had introduced into this country the first known member of the section, I. japonica, as well as many other plants.

There are no European representatives of the section, which is confined to south-eastern Asia with the exception of one or possibly two species in the United States of America.

The question of the relationship of the Evansia Irises to the other sections of the genus is extremely interesting but it is equally difficult to arrive at any satisfactory conclusion. The only species which has been crossed is I. tectorum, which has been combined with the small I. pallida known as Loppio, and with the other bearded Irises. The result is always a sterile hybrid with a beard arising from the top of a crest. In the case of the Loppio × tectorum cross the influence of the pollen of I. tectorum was so strong that the flowers have entirely the shape of tectorum and not that of the seed parent.

No general rules can be given for the cultivation of Evansia Irises and each species will therefore be considered separately. For a key to the species, *see* p. 86.

I. japonica. Thunberg, 1794. Central China and Japan.

This species has a slender, greenish rhizone and large tufts of broad, dark green leaves with a polished surface. The flower stems, which usually appear in April, are much branched and, though the individual flowers are short-lived, they are so numerous that the display continues for some weeks. The flowers are flatter than those of the bearded species, of a light lavender colour, with a few darker blotches near the centre of the blade of the falls, which have a jagged, wavy edge. Along the centre of the haft there runs a white ridge or crest tipped with orange. The spreading standards are of the same colour as the falls.

I. japonica is hardy in this country, at any rate in the south, though some forms are undoubtedly more liable than others to injury by frost. The fact that it is a commonly cultivated plant in Chitral shows that it is capable of resisting much greater extremes of heat and cold than any that we experience here but this is probably due to the thorough ripening of the rhizomes during the long summer drought and to the warmer conditions which prevail when once the spring comes.

Some forms are more or less successful out of doors here but in this climate the plant is practically evergreen and the foliage is usually battered and browned by frosts when the flowers appear in April. If it

cannot be grown in a cool house, it should be given a sheltered position, possibly among shrubs where it is protected from the morning sun.

When I. japonica is grown under glass, it is easy to rest the plants in summer and to start them again in the late autumn. They should then flower in the early months of the year from fine tufts of new, glossy foliage.

I. japonica does not appear to be fastidious as to soil, so long as it is supplied with adequate moisture during the growing season in spring and provided that the drainage is good.

For some reason this Iris refuses to set seed in this country and it is to be desired that seeds from the East will one day be available in the hope that seedlings grown here will give us even hardier plants than those which are already in cultivation.

I. Wattii. Baker, 1892. Assam and south-western China. Called after George Watt, who collected a specimen of the species on Khongui Hill, Manipur.

All that was known of this species for many years was one dried specimen in the Herbarium at Kew and it was difficult to decide whether to agree with Baker, who had doubtless seen it when it was fresh, and consider it distinct, or to identify it with I. Milesi or with I. japonica. It seemed different from both and yet it was not easy to define the difference.

However, towards the end of 1911 I received a small packet of seeds from Père Ducloux, a French missionary in Yunnan, and I saw at once from the seeds

To face p. 80.

I. Wattii.

(One-third natural size).

that, if they were those of an Iris, they were those of a species hitherto unknown to cultivation. The seeds germinated readily in the open and the plants grew rapidly and flowered in April, 1914, in their second year. Owing to the plant's extraordinary habit of forming stems one year and of flowering from their extremities in the following April, it is obvious that it is only in the mildest of winters that the plant is a success in the open. The plant grows very rapidly. The new growths appear about April or May and by September the stems are two feet or more in height with very broad, long leaves. There are five to seven leaves in each tuft, twelve to eighteen inches long and as much as three inches broad.

Planted out in a cold Alpine house in light rich soil, I. Wattii is a great success, for the tufts of leaves are then crowned with the branching inflorescence of white flowers, faintly tinged with pale mauve. The shape is similar to that of the flowers of I. japonica. The falls have an oblong blade with a wavy edge and a small erect orange crest in the centre of a small orange blotch. The pale mauve style branches end in large, jagged crests which rise prominently in the centre of the flower (*see* fig. 12, p. 80).

I. tectorum. Maximowicz, 1871. Central and south-western China. So called because it is grown on the ridge of thatched roofs in Japan.

This is perhaps the best garden plant in the Evansia section. The rather broad leaves, which are thin and strongly ribbed, grow to about eighteen inches in

length and the branching stem to about fifteen. The flowers are of a deep lilac or blue-purple and quite flat in outline, since the standards are extended almost horizontally. The blades of the falls are always mottled and blotched with a darker shade on a lighter ground and there is a conspicuous, jagged white crest, flecked with brownish purple. There is also a very beautiful albino form, which is wholly white, except that the markings on the crest are, in this case, yellow.

It is not a difficult plant to cultivate provided that it is well ripened in summer and grown in fairly rich soil. It seems to be very shallow rooting and for this reason should be frequently transplanted into fresh soil—an operation which is best carried out at the end of July or early in August, when root growth is active.

I. tectorum is one of the many plants, which became known to us first as growing in Japan, though it is probably not a native plant there but an introduction from China.

For hybrids of I. tectorum *see* p. 78.

I. Milesii. Foster, 1883. Named after Frank Miles, who raised the plant about 1880 from seeds collected by his cousin in the Kulu district to the north of Simla.

The growth of I. Milesii is like that of a large and vigorous form of I. tectorum with a stout, greenish rhizome. The branching stem grows as much as three feet in height but the flowers are relatively small and disappointing. They are of the same shape as those of I. tectorum but not so large and of a reddish shade

To face p. 82.

I. tectorum, a typical Evansia Iris.

(Half natural size).

of purple with darker mottlings. I. Milesii is quite hardy and seeds readily in this country but all attempts to cross it with I. tectorum or with any other species have hitherto failed, though a hybrid between these—tectorum and Milesii—would most probably produce a very desirable plant.

There is no difficulty in the cultivation of I. Milesii. It grows vigorously in any ordinary garden soil and, since its leaves die away entirely in the autumn, it is prepared to survive hard frost in winter.

I. gracilipes. A. Gray, 1859. Japan.

This slender little species is the only representative of the Evansia group which is confined to Japan, as a wild plant. It grows there in woodland glades with a rather cool aspect, and this gives us the clue to its proper cultivation here. It should have a moist half-shaded position in cool soil, rich in humus. In appearance it resembles a miniature I. Milesii, about nine to twelve inches high, but is peculiar in having spathes, which consist of one valve only. In this character it is unique among Irises. The colour is lilac or pinkish mauve and the small crested flowers are not more than one-and-a-half inches in diameter. The crest is orange and quite conspicuous and the stems are much branched.

I. gracilipes should never be moved in the late autumn or winter, but in spring or summer, when growth is active. The slender rhizome sends out comparatively few root fibres and it is imperative to move it when these are being formed. If this Iris is

moved later, it is unable to seize hold of fresh soil and almost invariably perishes in the winter.

I. speculatrix. Hance, 1875. The island of Hong-Kong and the neighbouring mainland of southern China.

This is one of the few Irises, which are extremely difficult, if not impossible, to cultivate and flower in this country, but this is hardly surprising when we remember that its home is in the Tropics.

It is a slender plant about a foot in height, with bright red-purple flowers, with a patch of white on the blade of the falls at the end of the yellow crest.

The plant is so imperfectly known that it is just possible that it does not belong to the Evansia Section at all. I once succeeded in raising some seedlings from imported seeds but the plants succumbed to frost before they reached flowering size.

I. cristata. Solander, 1789. The south-eastern United States from Georgia to Ohio. The crested Iris.

This species is very distinct from the Asiatic members of the Evansia Section. It is practically stemless and the flowers are raised above the ground, chiefly by the perianth tube, which is usually three or four inches long. The flowers are borne either singly or in pairs in the long, narrow, sharply keeled spathes and are of a light lilac shade. A central white ridge or crest runs along the haft of the falls. Along the haft it is tipped with orange but with lilac on the blade. There it is surrounded by a conspicuous patch of white edged

with deep lilac or lavender, which gradually fades away towards the circumference of the blade. The standards extend almost horizontally and are uniform in colour.

The slender, greenish rhizome runs rapidly and usually gives rise in the spring to about four new growths. Each of these grows horizontally for an inch or two and then throws up a vertical tuft of three or four leaves. Propagation is easy, if these new growths are severed and replanted immediately the flowers are over, for it is then that the roots are produced from the base of each tuft of leaves. It is extremely difficult to establish the plant, if transplantation is attempted in the autumn or winter, for the emission of new roots only takes place during a short period in summer and it is only at the beginning of this period that transplantation is easy.

I. cristata seems to like a cool, rather loose soil, which may be composed of gravel and humus. The position should be shaded during the heat of the day but this does not mean that the plants will prosper in dense shade or where they are closely overhung. Moisture at the roots is necessary, especially after transplantation, for a period of drought at that time would be fatal to the young plants.

A white variety has been in cultivation from time to time, but it does not appear to be robust, though it may be that it has been lost by attempts to transplant it at the wrong season.

I. lacustris. Nuttall, 1818. Named by reference to its home on the shores of the Great Lakes.

This is apparently nothing more than a local, northern form of I. cristata. The latter is found as far north as Ohio, while along the shores of Lake Huron and in Wisconsin it is replaced by a smaller and more compact plant, of which the colour is usually darker, though there is some variation among seedlings. The two plants do not appear to differ in structure in any way, but merely in size and colour. The foliage of lacustris is not much more than half as long as that of cristata, which has leaves six or eight inches in length and its new growths are more densely crowded.

I. lacustris should be treated precisely as I. cristata.

The various species may be separated as follows:—

	Spathes with one valve only.	I. gracilipes (p. 83).
	Spathes with two valves.	1.
1.	Stem produced in late summer.	I. Wattii (p. 80).
	Stem produced in spring.	2.
2.	Leaves persisting through winter.	I. japonica (p. 79).
	Leaves produced in spring.	3.
3.	Plants stemless.	I. cristata and I. lacustris (pp. 84 and 85).
	Stems produced.	4.
4.	Stems unbranched.	I. speculatrix (p. 84).
	Stems branched.	5.
5.	Stem tall, flowers reddish purple, rhizome green.	I. Milesii (p. 82).
	Stem shorter, flowers blue or white, rhizomes brown.	I. tectorum (p. 81).

X.

The Pardanthopsis Section.

As far as is known at present, I. dichotoma is the single representative of this section, which was named from the similarity of this Iris to Pardanthus or Belamcanda chinensis, a plant with foliage not unlike that of an Iris and flowers blotched with red on a yellow ground. Its seeds are enclosed in loose skins of a glistening blue-black and are sent from China from time to time as those of an Iris. The regular shape of the flowers shows, however, at once that the plant is not an Iris.

I. dichotoma. Pallas, 1773. Eastern Siberia, Mongolia and Northern China. The name was given with reference to the regular forking or branching of the stem.

This species is valuable for its habit of flowering in August and, although the individual flowers are not very large, yet the branching stem produces so many heads of flower that the display continues for several weeks. Unfortunately each inflorescence bears so many flowers that they seem to exhaust the energies of the plant, which usually dies after flowering without leaving any side growths for the following year. However, seeds germinate readily and the young plants

should flower in little more than a year from the time when the seeds germinate.

The colour of the flowers is variable; some specimens are white with a few brown-purple spots, while others are of a lurid reddish purple, with a central white blotch on the blade of the fall.

The shape of the flowers is curious and characteristic, for the haft of the falls rises at an angle of about 60 degrees but the blade is extended horizontally. The oval style branches grow together for a short distance above the base and divide at the apex into long and very narrow crests. The perianth tube is extremely short, less than one-eighth of an inch in length and the flowers twist spirally as they wither. Another peculiarity is that the unfertilized ovaries fall off at the slightest touch, whereas in all other Irises they remain attached to the pedicel.

The stem is usually over two feet high and from its base spring the fan-shaped cluster of six or eight leaves.

I. dichotoma needs a warm, sunny position but does not seem to be exacting as to soil. Care should be taken, however, to give it enough moisture to enable it to flower well in August. It must not be allowed to get too dry during the growing season.

XI.

The Apogon Section.

This section, the largest in the genus, may be defined as containing all rhizomatous species of which the falls are neither bearded nor crested. It comprises more species than any other section but seems to split up naturally into a number of small subsections, of which the individual members are closely related to one another. For reasons given in Chapter III, it would seem that the Apogons are perhaps the oldest of all Irises, though there are among them at least two subsections, which have developed in comparatively recent times. In south-western China there are a number of local species of restricted distribution closely allied to I. sibirica while in California there is another very characteristic group of species all of which are very closely related to one another.

On the other hand there are also in the section a number of single species, which appear to stand quite by themselves, for they have no distinctive characters in common with any other species.

It will perhaps be best to deal with each of these small subsections separately because the treatment of all the members of each is in nearly every case substantially the same.

The Sibirica Subsection.

All the members of this group with the exception of the Himalayan I. Clarkei and the American I. prismatica have hollow tubular stems and differ in this character from all other Irises. They like a cool, moist soil rich in humus, though most of them will hold their own in any well-cultivated ground, enriched with a liberal proportion of old leaf soil or well decayed manure. They can be moved when growth is beginning in spring but there is a certain risk attached to the proceeding, especially if it is followed by a period of drying winds, before the plants have been able to push out their new roots and obtain a firm hold of the ground. On the whole, it is better to move them in September, especially when the weather is showery. It need hardly be added that, if the season is hot and dry, transplantation should be postponed until rain comes.

Increase by seeds is easy and fairly rapid, since the young plants should, if well treated, begin to flower in their second year. The drawback to this method of increase is, of course, that specially fine forms do not always reproduce themselves from seed, though there is a good chance of obtaining equally good, though slightly different, seedlings.

The species from south-western China, such as Forrestii and chrysographes, produce fertile hybrids, when crossed together though sibirica × Wilsonii gave

a sterile hybrid. These species also combine fairly readily with the Californian species but the hybrids are in all cases sterile. Thus I. chrysographes crossed with a flesh-coloured form of I. Douglasiana produced a beautiful hybrid of a crushed strawberry colour with much gold veining in the centre of the blade of the falls. I. Clarkei also proved fertile to the pollen of I. Douglasiana and the leaves of the hybrid had the polished upper surface which is characteristic of I. Clarkei. I. Wilsonii × I. sibirica produced a very floriferous but sterile plant, with flowers like those of sibirica but with a yellow instead of a white ground underlying the blue. I. Wilsonii had also the same influence in a cross with I. Delavayi, while I. tenax × I. Wilsonii produced a plant with masses of frankly ugly flowers, much dotted and speckled with purple on a yellow ground. This hybrid was likewise quite sterile.

The species comprised in the subsection may be separated as follows :—

	Stems hollow.	1.
	Stems solid.	7.
1.	Standards or inner segments held erect.	2.
	Standards inclined outwards at angle of 45 degrees.	4.
2.	Foliage dull green, both surfaces.	3.
	Foliage with polished upper surface, dull under surface.	I. Forrestii (p. 98).

3.	Seed capsules on pedicels very unequal; capsules short and broad; stems much longer than the leaves.	I. sibirica (p. 92).
	Seed capsules on pedicels not very unequal; capsules long and narrow; stems about equal in length to the leaves.	I. orientalis (p. 93).
4.	Foliage with polished upper surface, dull under surface.	I. Bulleyana (p. 99).
	Foliage dull-green on both surfaces.	5.
5.	Stems much longer than the leaves; seeds thin and circular.	I. Delavayi (p. 95).
	Stems about equal to the leaves.	6.
6.	Pedicels short, tube long, seeds pear-shaped, flowers purple.	I. chrysographes (p. 96).
	Pedicels long, tube short, seeds cubical, flower yellow.	I. Wilsonii (p. 97).
7.	Stems thin and wiry; plant with widely running habit; leaves dull on both surfaces.	I. prismatica (p. 101).
	Stems stouter; plant compact; leaves with glossy upper surfaces.	I. Clarkei (p. 100).

I. sibirica. Linnaeus, 1753. Central Europe and Russia.

This fine Iris seems to have no real claim to its name, for there is no evidence that it is really a native of Siberia. It was probably confused at an early date with the Siberian I. orientalis and the confusion, which then arose, still exists in gardens, though the two plants are really quite distinct.

To face p. 92.

I. sibirica.

(About two-thirds natural size).

I. sibirica has tall hollow stems that rise well above the narrow grassy foliage and the comparatively small flowers emerge on long pedicels from short spathes which are wholly brown or scarious at flowering time. The seed vessels are broad and rounded and the seeds flat, thin and shaped like a capital D (*cf.* the description of I. orientalis, p. 94).

The typical plant has blue flowers with a delicate network of blue veins on a white ground in the centre of the falls (*see* fig. 15, p. 92). There is a certain amount of variation in the shade of blue and in the height and size of the plant. There are also white forms, usually with a more or less pronounced tinge of mauve or lavender, caused by the presence of coloured veins and shading. Pale blue forms may be obtained by crossing the white and the blue varieties and I. sibirica also combines readily with I. orientalis to produce hybrids with the tall stem of the former and the large flowers of the latter. A judicious mixture will also produce pale sky blue forms of the hybrid between them.

I. orientalis. Thunberg, 1794. Manchuria and Japan.

This Eastern species differs from I. sibirica in having stems which are shorter or at any rate not longer than the leaves, of which, however, the upper third droops so that the flowers are raised above them. The foliage is broader than that of I. sibirica, and the flowers are relatively much larger than those of that species, the falls especially being broad and rounded. The spathes are broad and long, nearly wholly herbaceous at flowering time and often suffused with red-purple, a

character which gave rise to the varietal name of sanguinea. The seed vessels are at least three times as long as they are broad and the seeds small and cubical, so that in these essentials I. sibirica and I. orientalis are very different.

The typical form of this species has flowers of a rich blue-purple, through which the white ground shows at the centre of the falls, but there are also white forms, of which one has long been in cultivation under the name of Snow Queen. Crosses between this and the blue form produce hybrids with pale blue flowers and the species also crosses readily with I. sibirica (*see* p. 93).

Our knowledge of the local forms of this species is by no means complete. Herbarium material is not very helpful and it is not easy to obtain seeds from wild plants. It is, of course, very difficult to import living plants from Corea and Manchuria, for plants with slender rhizomes such as those of I. orientalis and I. sibirica cannot be kept out of the ground and dry for any length of time and yet survive, while if they are packed in wet materials, they invariably get mouldy and succumb on the journey.

There appears to be, however, in Corea a plant in some ways intermediate between sibirica and orientalis and distinguished by the green ground that shows up on the blade of the falls and along the haft. There is also in Japan a form with rigid, narrow foliage and dark richly-coloured flowers, which, however, was by no means floriferous in this country when I grew it some years ago. It would be extremely interesting to

obtain collected seeds and to grow plants raised from them side by side in order to ascertain their points of difference and agreement, both with each other and with I. orientalis and I. sibirica.

I. Delavayi. Micheli, 1895. Named after the Abbé Delavaye, who discovered the plant in Western China. It grows in swampy ground in Sze-chuen.

This fine species is larger and stronger than I. sibirica and grows to a height of three or four feet or even more in rich, moist soil. It agrees with I. sibirica in having a hollow tubular stem but has broader leaves and long, green spathes, of which the outer valve is longer than the inner. The blade of the fall is longer and larger than that of I. sibirica and the white ground shows plainly in rather large and often oblong blotches, unobscured by any network of veins. The standards are rather narrow and extend at an angle of 45 degrees, instead of standing erect or even inclining inwards as do those of I. sibirica. The colour in the specimens first introduced was always a rich red-violet but in others raised from seeds sent home by Wilson there is considerable variation in all shades of blue and red-purple.

This latter form of I. Delavayi is a very desirable species for the bog garden, particularly as it flowers late in June and July, when I. sibirica is over. It is not so well adapted for cultivation in the ordinary border as is I. sibirica, for it must have abundant moisture during the growing season. If this is available, however, it is capable of producing a very fine effect.

I. Delavayi can be crossed with I. Wilsonii which imparts its yellow ground to the flowers and it would doubtless also cross with other members of the sub-section.

I. chrysographes. Dykes, 1911. South-western China. The name was given to describe the flower which is veined with gold.

This fine species has suffered very much from the fact that, when the first illustration of it appeared in the " Botanical Magazine," t. 8433, in 1912, it was so badly drawn that the figure was utterly unlike the plant. Indeed, so distorted was it that the author of the text, relying apparently on the plate and not on his recollection of the living plant, described it as like I. laevigata, with which it has nothing whatever in common.

I. chrysographes is obviously allied to I. sibirica. It has the narrow, grassy, rather flimsy foliage, the hollow stem and the same close growing mat of slender rhizomes and the numerous root fibres of the moisture-loving species. The stem has thicker walls than has that of I. sibirica, but there is always an open channel running up the centre. In shape the flowers are not unlike those of I. Delavayi for the standards are poised at an angle of 45 degrees instead of being held erect as in I. sibirica and I. orientalis. The long blade of the falls is not extended as in I. orientalis, but hangs perpendicularly and bears always a few, and sometimes a large number of, golden streaks or veins,—the feature to which the plant owes its name. The tapering

seed capsule and the flattened pear-shaped seeds readily distinguish this species from any other in the subsection.

Cultivation is easy in any moist, cool soil, rich in humus. Plants should be moved and divided when necessary in early autumn, when the ground is moist and still warm, so as to encourage root growth before winter. Seeds germinate very readily and the young plants should flower in their second year.

The colour of this species is always a rich, deep red violet, sometimes almost black. The central patch of golden veins is sometimes reduced to a single line but by selection it would doubtless be easy to obtain forms in which this striking feature became more pronounced.

I. chrysographes crosses readily with I. Forrestii to form fertile hybrids but hybrids with the Californian I. Douglasiana and with I. sibirica were sterile. It is, however, so fine a species in its wild form that it seems doubtful whether there is anything to be gained by crossing it, beyond, perhaps, a knowledge of its relationship to other species.

I. Wilsonii. Wright, 1907. China, in western Hupeh and in Shensi. Named after its discoverer, E. H. Wilson.

In appearance this species might almost be described as a yellow-flowered I. chrysographes, for the standards are extended at the same angle and the foliage and habit are very similar. Botanically, however, it is quite distinct by reason of its long pedicels, which become eventually four or five inches long and raise

the seed capsules above the dried remains of the long, narrow, tapering spathes.

The standards are of a very pale cream, but the style branches are of a bright yellow. The pale yellow falls are veined in the bright yellow centre with a few fine broken lines of reddish brown beyond which the colour becomes a paler yellow, sometimes faintly veined with purple.

The flowers are scarcely large enough nor of a clear enough colour to make the plant effective, but for garden purposes it can be utilized by hybridization to give a yellow, instead of a white, ground to the flowers of hybrids with such species as sibirica, Delavayi and others.

Cultivation is easy in moist soil, rich in humus, where a good plant should send up a sheaf of stems to a height of about two feet or a little more. The grassy leaves are about the same length but reflex gracefully in the upper part. They have a slightly marked midrib, which at once distinguishes them from the only other known yellow flowered member of the sibirica group, namely I. Forrestii.

Herbarium specimens seem to indicate that there may be purple flowered forms as yet unknown to cultivation or it may be that these specimens are to be assigned to I. chrysographes or to yet another unknown species.

I. Forrestii. Dykes, 1910. Discovered by George Forrest on the Lichiang Range in north-west Yunnan.

This is a more slender and more pleasing species than I. Wilsonii, with clear yellow flowers, sometimes but not always bearing a few, broken, inconspicuous purplish veins. The foliage is narrow with a glossy upper surface and the stems rise well above it to the height of fifteen to eighteen inches from the ground. The almost erect standards and the large seed capsules on short pedicels, not more than an inch in length, also help to distinguish I. Forrestii from I. Wilsonii.

This species is a native of high alpine pastures at an altitude of twelve to thirteen thousand feet, where it is doubtless well supplied in spring and summer with moisture percolating through the soil. This fact indicates the treatment that it requires here, for it dwindles away in hard, dry soil. It must have abundant moisture during the growing season in a soil rich in humus.

There is considerable variation among seedlings, chiefly in the shape and size of the falls and it seems best to select those of a clear yellow and not the veined forms which sometimes occur.

I. Bulleyana. Dykes, 1910.

When I first received this plant from Mr. A. K. Bulley, I understood that it came from the same region of Western China as I. Forrestii. Mr. Forrest, however, told me subsequently that he had no recollection of collecting such a plant and I am now inclined to think that it is a hybrid, though whether the cross was effected naturally in China or whether it occurred in this country, it is now impossible to tell.

The typical plant is not unlike I. Wilsonii in growth and has spreading standards and falls. The former are of a uniform deep lilac and the latter veined and blotched with blue-purple on a faint yellow ground. The plant is fertile but there is very great variation among the seedlings, some of which closely resemble I. Forrestii. The seed vessel is quite distinct from that of any other member of the group but this might well be the case with a hybrid between two of its members.

I. Clarkei. Baker, 1892. The neighbourhood of Darjeeling, particularly along the ridge of Tonglo, and the Chumbi valley. Named after J. B. Clarke who collected herbarium specimens in 1875.

When Baker first described this Iris, he based his description very largely on a sketch by Hooker preserved in the Kew Herbarium. At the edge of the sheet there is written very faintly in pencil "no beard or crest" but Baker failed to see the "No" and read it as "beard and crest." Accordingly he placed the plant in a Pseudevansia section and it was not until plants and seeds were obtained from Tonglo in 1907 that the truth about the plant became known.

I. Clarkei is at once distinguished from all other Asiatic members of the group by its solid and not hollow stem. The foliage is glossy on the upper surface and glaucous beneath, a feature which distinguishes it from all but I. Forrestii, of which, however, the foliage is much narrower. The narrow standards extend almost horizontally and the large

drooping falls are very variously marked. A long series of plants collected on the Tonglo ridge succeeded for some years at Godalming, in Surrey, and showed how extraordinarily variable in colour I. Clarkei can be. The flowers were of all shades of blue- and red-purple and the markings showed considerable differences. In some forms there was a distinct white patch at the centre of the falls, though in others it was almost entirely obscured by a fine network of veins.

The flat, disc-like seeds are very distinct and could only be confused with those of I. Delavayi. I. Clarkei, however, is a much dwarfer plant with a branching stem about two feet long. Possibly this branching habit and its solid stem might justify its claim to constitute a separate subsection but both these characters appear in I. prismatica, the one American relative, and it seems best, or at any rate most convenient, to include both these species with the other sibiricas.

I. prismatica. Pursh, 1814. The eastern United States, along the coast from Maine to Carolina. The name possibly alludes to the curious shape of the seeds.

This species is the one American representative of the group. In appearance it looks like a small I. sibirica with tufts of foliage, which rise here and there, separated by the running rhizomes and not in dense clusters. The stem is about eighteen inches in height, solid and remarkably wiry and never apparently quite straight and upright but curved and bent in a curious and characteristic fashion.

The small spathes are entirely scarious at flowering time as in I. sibirica and the flowers are raised on pedicels about one-and-a-half or two inches long. The standards are violet in colour and erect as in I. sibirica and the falls, which tend to reflex and curl in under the haft are veined with the same colour on a white ground. The buff-coloured, almost cubical seeds distinguish it at once from all the allied Asiatic species.

It is essentially a plant for the bog garden or at any rate for a position in a cool, moist soil, where it will obtain plenty of moisture throughout the growing season.

The Spuria Subsection.

The chief characteristics of the species, which form this subsection, are the curious formation of the ovary, which has two ridges running down each of its three angles (*see* fig. 16, p. 106), the semi-transparent parchment-like envelope which encloses each seed and the double-toothed stigma. In all other species the stigma is either a broad lip or a tongue-like projection, whereas in the spurias there is a sharp, projecting point beneath each of the two crests.

A more striking feature of the group is the way in which the branches of the stem rise perpendicularly and lie close to the main stem so that the flowers appear one above the other as though they all sprang directly from the main stem. This arrangement is very obvious in such well-known plants as I. ochro-

leuca and I. aurea. In all cases the blade of the falls is separated by a narrow neck from the oval haft and there is a striking resemblance between the flowers of some varieties of spuria and those of I. tingitana and of large forms of I. xiphium. Another curious point in common is that the spurias also resemble these species in the way in which drops of nectar are exuded on the outside of the base of segments of the flower.

All the species of the spuria subsection are easy to cultivate. They do well in good loamy soil as well as in sand enriched with humus and they will also flourish in stiff clay, provided that the position is sloping and the drainage adequate. It must, however, be remembered that the substance of the rhizomes is more fibrous and less fleshy than that of the Bearded Irises and that the rhizomes are therefore less able to retain their vitality, when out of the ground. We are obliged therefore to move the plants in the early autumn rather than in the height of summer, when the flowers have just faded. September is probably the best time. The larger plants such as ochroleuca, Monnieri, Monspur and aurea look exceedingly well when grown in large clumps in herbaceous borders. The rather stiff, tapering leaves grow to a height of three or four feet and the true gigantea strain of ochroleuca is quite capable of throwing up stems five feet in length.

The various species of the spuria subsection may be separated as follows :—

Stem very short.	I. humilis (p. 105).
Stem at least several inches long.	1.

1.	Stem flattened with a sharp flange down either side.	I. graminea (p. 105).
	Stem rounded without flanges.	2.
2.	Spathes sharply keeled.	I. Sintenisii (p. 106).
	Spathes rounded, not sharply keeled.	3.
3.	Plant dwarf, stem less than 12ins., and so glaucous that it feels rough to the touch.	I. Urumovii (p. 107).
	Plant more robust and not so glaucous.	4.
4.	Stem unbranched.	5.
	Stem usually branching.	6.
5.	Blade of falls pointed; flowers yellow.	I. Kerneriana (p. 107).
	Blade of falls rounded; flowers blue-purple.	I. Farreri (p. 108).
6.	Rhizomes densely clothed in diagonally-crossing fibrous remains of old leaves; style crests very long and narrow.	I. songarica (p. 108).
	Rhizomes not clothed in fibrous remains of old leaves; style crests short and broad.	7.
7.	Stem shorter than the leaves; blade of fall very small and extended horizontally.	I. halophila (p. 109).
	Stem longer than leaves; blade of fall large and drooping; not extended horizontally.	8.
8.	Blade of falls long, with waved edge; whole flower rich golden-yellow.	I. aurea (p. 110).
	Blade of falls rounded.	9.

9.	Flowers white and yellow; seeds with very loose, almost colourless outer coats.	I. ochroleuca (p. 110).
	Flowers blue-purple; seeds light brown, outer coats not very loose.	I. spuria (p. 111).

I. humilis. Bieberstein, 1808. Transylvania, southern Russia, and probably also the Altai region in Siberia.

This dwarf Iris has foliage not unlike a small form of graminea but, as no stem is produced, the flowers appear almost on the ground, being only raised by the long tapering neck of the ovary. On the blade of the falls the colour consists of purplish veining on a yellowish ground and the standards are a deep violet blue. It flowers late in May or early in June.

I. humilis can hardly be called an ornamental garden plant but might be grown on a ledge in a rock garden where its flowers would be visible. It has been confused with I. ruthenica and with the narrow leaved forms of I. unguicularis but the double ridges on the ovary and capsule and the two, pointed, stigmatic teeth should easily distinguish it.

I. graminea. Linnaeus, 1753. Southern and Central Europe and probably the Caucasus. So called on account of its grassy foliage.

This curious Iris has the habit of hiding its flowers amidst dense tufts of leaves, which have a brightly polished upper surface, though the under surface is dull and slightly glaucous. The stem is unlike that of any other Iris, for it is much flattened and has a

sharp ridge or flange running down either side. For cutting purposes this Iris is admirably adapted, for each stem bears a leaf which rises above the flower and in good forms the flowers have the fragrance of a ripe greengage. The quality and amount of the scent seems to vary in individual plants but good forms can be found among any batch of seedlings. The leaves may be very narrow or as much as an inch in width and another curious feature is the variability of the spathes. One valve may be equal in length to the other or three or four times as long as the other and what is still more curious is that examples of both these extremes and of intermediate forms can often be found on the same plant.

The blade of the falls is usually more or less veined with violet-blue on a white ground, while the standards and particularly the style branches are of a redder tone. There are, however, in the Balkans forms in which the flowers are almost wholly of a reddish-mauve colour.

I. Sintenisii. Janka, 1874. Southern Italy, the Balkans and Asia Minor. Named after Sintenis, a botanical collector.

This plant is intermediate in appearance between I. graminea and a small I. spuria. Botanically it differs, and it may be easily recognized, by the sharply keeled green spathes.

The flowers are somewhat small and slender, usually veined and minutely dotted with violet-blue on a white ground. The foliage is stiff and upright in the

To face p. 106.

Inflorescence of I. spuria (No. II) and seed-capsules of I. Sintenisii, showing double ridges at the angles.

(Half natural size).

Balkan forms but more inclined to droop outwards in fanshaped tufts held at different angles in plants from Southern Italy. Attempts have been made to distinguish the two forms botanically but, though this difference in the foliage is a character that can be seen in plants growing side by side, it would probably not appear in herbarium specimens.

I. Urumovii. Velenovsky, 1902. Bulgaria. Called after Urumoff, who collected specimens near Trnovo in 1902.

This slender little species is obviously closely related to I. graminea and to I. Sintenisii. It has exceptionally glaucous foliage, so glaucous that the leaves are distinctly rough to the touch and appear a blue-grey near the base. The leaves are erect and slender, less than a quarter-of-an-inch in width and about a foot in length, thus overtopping the short stem, which bears two flowers. These are very similar to those of I. graminea, the blade of the falls being veined and minutely dotted with deep blue on white, while the standards and style branches are of a redder shade of purple.

From I. Sintenisii it may be distinguished by the absence of keels to the spathes, by its slender upright habit and by the fact that its leaves die away entirely in the autumn, while those of Sintenisii remain erect and more or less green until the spring.

I. Kerneriana. Ascherson and Sintenis, 1884. Asia Minor. Named after Kerner, an Austrian botanist.

This is a small Iris with a stem of some six to twelve inches in length bearing two yellow flowers with pointed, lance-shaped blades to the falls. It must be very similar to I. Sintenisii except for the colour of the flowers, for the shape of the falls and for the fact that the spathe valves are not sharply keeled. It is probably not in cultivation in this country at present.

I. Farreri. Dykes, 1915. South-western China. Named after its discoverer, Reginald Farrer.

This is the plant which Farrer took to be I. graminea and described as growing in the alpine pastures of south-western China. Its flowers, doubtless, are very similar to those of I. graminea but it differs in having a rounded, and not a flattened stem. From I. Sintenisii it differs in its narrow flimsy foliage and by the fact that only the outer spathe is at all keeled and that only slightly.

I. songarica. Schrenk, 1841. Persia to Thibet. Named after the district of Songaria in Central Asia, in which it was first found.

This curious species has only occasionally been in cultivation and it is to be hoped that it will be reintroduced before long. The slender flowers are of the shape of those of I. spuria but the colouring is very different. The centre of the blade of the falls is minutely dotted with purple on a bluish ground while the outer part is almost white and bears large purple dots or blotches. The standards are veined and blotched with red-purple on a whitish ground and the

perianth tube is very long, always more than one inch in length and frequently more than two inches.

This species may be recognized by the inch-long, narrow style crests, which cross one over the other and by the coarse fibres which run diagonally one over the other and enclose the slender rhizomes. These fibres are the remains of the leaves of former years.

I. halophila. Pallas, 1773. Persia, Turkestan and Afghanistan. It was called " salt loving " because it is found in the salt marshes of Central Asia.

No Iris is more common than this either under its own name or under that of I. Güldenstadtiana in all botanic gardens. It is very hardy, seeds very readily and so springs up where more delicate species have died out. Then its seeds are solemnly collected and distributed to other botanic gardens and to private individuals under all kinds of attractive names. Specimens of this Iris probably formed the majority of the collection which the Danish botanist, Lange, tried to establish by obtaining seeds from various gardens and which led him to complain to Baker, at that time Keeper of the Kew Herbarium, that " the major portion of the Irises he had educated from seeds had received improper names."

The ample foliage is rather longer than the stems, which are twelve to eighteen inches long, with one or two lateral heads of flowers, below the terminal spathe. The flowers are rather small and narrow, with a small rounded blade to the falls, which projects almost horizontally instead of being reflexed downwards as

in I. spuria. The colour is either white more or less veined with purple, a dull yellow or a grey purple. Only in rare cases are the flowers good enough to make it a desirable garden plant but I once had a group of seedlings, which persisted in flowering regularly a second time each year in September and October.

I. aurea. Lindley, 1847. Kashmir. So called on account of the golden colour of its flowers.

This tall, stately species is a fine border plant and does well in rather strong, fertile loam. The stem is three feet or more high, bearing three or four clusters of flowers one below the other. The long, narrow spathes each contain two or three of the rich golden flowers, which have an oblong blade to the falls with a frilled edge. The firm, erect foliage is rather shorter than the stems and dies completely away in the winter.

Although I. aurea is always described as a native of Kashmir and although the original plants were raised from seeds from that country, it is by no means certain that it is indigenous there. Possibly it may have been introduced from Asia Minor and in this connection it must be remembered that I. Kharput was described as coming from Kharput in Asia Minor but that it is also naturalized in the neighbourhood of Srinagar, in Kashmir.

Possibly I. aurea is not even a species, for its relationship to I. ochroleuca and to Monnieri has never been worked out yet.

I. ochroleuca. Linnaeus, 1771. Western Asia Minor. So called by reason of its white and yellow flowers.

In its finest forms this is one of the tallest and most stately of all Irises. The stems may be as much as four feet and more in height, with several tiers of large white and yellow flowers. The strong, somewhat twisted leaves are from one to two inches broad and about three feet long. The flowers are usually white except for the blade of the falls which has a large central patch of golden yellow. The exact amount of yellow varies in individual seedlings though it is uncertain to what extent this variation occurs among wild plants.

I. Monnieri (de Candolle, 1808) is very similar to I. ochroleuca except that the flowers are wholly of a soft yellow and very smooth in texture. It is probably merely a colour variation and not a distinct species, though it is very different in its effect as a garden plant. It does not come true from seed, if self-fertilized, but the majority of the seedlings are similar to I. ochroleuca. Foster crossed Monnieri and spuria and obtained free-flowering hybrids with flowers of a light blue-purple, to which he gave the name of Monspur.

I. spuria. Linnaeus, 1753. It is not known why this Iris was called " the bastard."

The distribution of the various forms of I. spuria in nature is an interesting puzzle of which the key has not yet been found, for the war made it impossible to carry on research work and to raise all the various local forms from seed as I had hoped to do. The facts, as

far as they appear to be known, at present, are that there are at least three distinct forms :—

I. Produces only a terminal head of two flowers and is a slender plant with narrow leaves. The stem is about a foot or fifteen inches long. This form occurs in Spain, near Madrid, and in France in marshes near Rochefort and near Agde at the mouth of the Hérault.

II. Produces one or two lateral heads of flowers as well as the terminal two-flowered spathe. These lateral heads are set far apart on the stem so that the internodes of the stem are plainly visible. This form occurs on the Danish island of Saltholm and, strangest of all, in one place in the fens near our own East Coast in Lincolnshire. It may also occur in Algiers.

III. Has the lateral buds of II but the stem is dwarfer so that its internodes are entirely hidden in the sheathing leaves. This is the form which is found in the marshes between Hyères and the sea and also in Algeria.

Of all these forms the flowers are practically identical being of a rich blue-purple on the blade of the falls and slightly redder in the standards. The stigma has always two prominent teeth and the pollen is orange scarlet. The style branches are reddish-purple and the crests small and triangular.

A much larger and finer plant with paler flowers grows near Srinagar, in Kashmir, and has been described under the name of I. Carthaliniae by Fomin as a native of the Caucasus. In the present state of our knowledge it is impossible to say whether these various forms are natives of these regions.

In all cases the foliage is sturdy, of a dark green and dies away in the late summer. The rhizomes are more slender than those of a Bearded Iris and much tougher and more fibrous. The roots too have a wiry core, at any rate when they are mature, such as is not found among the Bearded Irises.

The Californian Subsection.

The species comprised in this subsection are confined to California and a few adjacent states and, as we should therefore expect, are practically evergreen. At any rate, except in very severe winters, they retain the leaves of one season until those of the next are pushing up. The leaves are peculiarly hard and tough in texture and have the further characteristic that, when they die they turn to a dull, brick-red and not to the brownish-yellow of most other Irises. Moreover they are almost always coloured pink at the base.

Another peculiarity of most of the species is the extraordinary amount of variation that there is in the colour of the flowers. In fact, it is almost true to say that no two individual plants of Douglasiana, tenax or macrosiphon have identical flowers. These Irises lend themselves admirably to cutting, and vases of the flowers, of which each one is different though all harmonize together, are so beautiful that it is a matter for surprise that they are not more widely grown.

The reason for this is probably that the plants cannot be treated like other Irises. The rhizomes are

very slender and the root fibres few in number. Consequently the plants soon perish if they are left long out of the ground. Moreover, for about half the year the plants seem content to live on their old roots and it is quite useless to attempt to move them when their roots are inactive. They make no attempt to take hold of the ground and soon succumb. On the other hand when growth is active in spring and summer, it is comparatively easy to transplant these Irises, provided that the rhizomes and roots are not allowed to get dry or to lack moisture for a few weeks when they are replanted.

The best method of increase is, however, by seeds, though transplantation is the only method of multiplying any particular variety. Seedlings planted out with four or six leaves in early summer should flower the next year or at latest the following year. The soil should be fairly light and rich in humus and it seems impossible to grow these species in ground that is heavily charged with lime. The plants should be top-dressed at intervals with light, rich soil, which should be worked well in among the growths. Even with this treatment the soil will probably show signs of exhaustion after some years and the plants must either be transplanted or else dug up and a fresh start made with seedlings.

It seems not improbable that there are a number of local forms of these Irises, which are very imperfectly known. For instance it is uncertain whether I. Hartwegii should rank as a species or whether it should be looked upon as a dwarf, yellow-flowered form of

I. tenax. There is also in Tulare Co., California, at a height of about 2,000 feet on the foothills of the Sierra Nevada a plant with rather scanty foliage of a grey, glaucous green which agrees with I. tenax in having the widely separated spathes, so characteristic of that species. This plant, is, I believe, sometimes known as Hartwegii australis and has large flowers of the same shape as those of tenax and of varying shades of purple, usually with darker veins upon a paler ground.

The other species may be distinguished as follows :—

	Stems usually branching.	1.
	Stems not branched.	2.
1.	Perianth-tube linear for some distance above the ovary.	I. Douglasiana (p. 116).
	Perianth-tube funnel-shaped immediately above the ovary.	I. tenuis (p. 117).
2.	Perianth-tube funnel-shaped immediately above the ovary.	3.
	Perianth-tube linear above the ovary.	4.
3.	Spathes broad, overlapping; foliage very scanty.	I. bracteata (p. 117).
	Spathes very narrow, widely separated and set some distance apart on the stem.	I. tenax (p. 118).
4.	Stems concealed in broad, overlapping bracts.	I. Purdyi (p. 119).
	Stems bearing narrow, reduced leaves and exposed between them.	5.

5.	Stem about equal to or not much longer than the perianth-tube.	I. macrosiphon (p. 120).
	Stem many times as long as the tube.	I. tenuissima (p. 121).

I. Douglasiana. Herbert, 1841. Found near the coast of California from Humboldt Co. to Monterey. Named after Douglas who explored the botany of California early in the nineteenth century.

This beautiful and extremely variable species is distinguished by its strong and usually dark green foliage, which turns a dull dark red as it dies, by the short linear tube above the long, triangular ovary which tapers gradually at either end and by its smooth, spherical seeds. It forms dense masses of foliage from which issue numerous branching stems, bearing several heads of two or three flowers each. Some forms are of weaker growth and are less floriferous and some have lighter green foliage. Some of these forms have received specific names, such as Watsoniana and amabilis but, unless we are to give specific names to every small local variation, it seems unwise to give them in these cases.

The perianth tube above the acutely angled ovary is nearly an inch in length and is of a pale yellowish green, when the flowers are pale, and of a purple shade, when the flowers are deeply coloured.

The colour of the flowers varies from the deepest violet-purple, through purple and mauve to lavender and the palest flesh colour and even white. In the centre of the falls there is usually a more lightly coloured patch netted with darker veins. The standards are slightly shorter than the falls and of the same colour.

I. Douglasiana will probably hybridise with other Californian Irises and I have also succeeded in crossing it with the Chinese I. chrysographes and with the Himalayan I. Clarkei. In the former case the variety of I. Douglasiana was pale in colour and the hybrid was of a beautiful crushed strawberry colour with a large patch of gold veining in the centre of the falls. Both these hybrids are entirely sterile (*see* p. 91).

I. tenuis. Watson, 1882. This slender Iris is only found in fir forests near the Clackamas River in north-western Oregon.

The creeping rhizomes spread widely in loose, decaying vegetable debris and send up branching stems about a foot in height. The flowers are white with a few purple veins and a patch of yellow in the centre of the falls. I. tenuis can be readily distinguished from other Californian Irises by its branching stem and by the way in which the tufts of leaves appear at a distance from each other. I. Douglasiana is the only other species with a branching stem and that is separated at once by its habit of forming dense masses of leaves and by its long, slender perianth tube. I. tenuis has never been successfully cultivated for long in this country but there is no reason why it should not be established if seeds could be obtained. Imported rhizomes would almost certainly fail.

I. bracteata. Watson, 1885. This species is apparently found only in Oregon and owes its name to the bractlike leaves which clothe the stem.

It is a plant which makes very scanty growth and remarkably few leaves. These are thick and leathery with a polished, deep green upper surface, nearly half-an-inch broad and eighteen inches or more long when fully grown. They are produced singly and not in fan-shaped tufts.

The stem is only six or eight inches long and bears a single head of two flowers. These are yellow, more or less conspicuously veined with brownish purple. The short, broad, funnel-shaped tube separates it at once from I. Purdyi with which it is sometimes confused.

I. bracteata is a difficult plant to move successfully. It should always be raised from seeds and the seedlings put out into their permanent positions in their first year. If for any reason it is impossible to do this, then each seedling should be potted separately so that they can be planted later on without disturbing the roots.

Some years ago a number of rose-red specimens appeared among a batch of seedlings but I am inclined to think that this colour was due to hybridisation with Douglasiana or with tenax. There is no evidence that in the wild state any colour but yellow is found.

I. tenax. Douglas, 1829. Found in the states of Washington and Oregon and namely apparently with reference to the strength of the fibres of the leaves, which the Indians used to twist into cord.

This is a remarkably graceful and pleasing Iris. It forms dense clumps of narrow foliage from which rise a great number of slender stems about twelve or fifteen

I. tenax.

(Two-thirds natural size).

inches long, each bearing two flowers in succession. A characteristic feature is the way in which the narrow spathe-valves, instead of springing from the same point on the stem as in the other Irises, are set an inch or more apart from one another on the stem. The perianth tube is broad and funnel-shaped, less than half-an-inch long.

The flowers have a rounded blade to the fall, with a pale central patch, usually slightly stained with yellow, and crossed by deeply coloured veins. The colour of the flower varies from a deep, rich red-purple through mauve and lavender to the palest pearl-grey (*see* fig. 17, p. 118).

I succeeded in crossing I. tenax with the Chinese I. Wilsonii but the sterile hybrid was frankly ugly. The flowers were closely speckled with dark blue-purple on a yellow ground.

I. Purdyi. Eastwood, 1897. Found only in the Redwood districts of Sonoma and Mendocino counties in California and named after Carl Purdy of Ukiah, a well-known collector and grower of Californian plants.

This species was originally confused with I. Douglasiana, and it is possible to obtain pale yellow flowered forms of the latter of which the flowers are undoubtedly very similar to those of I. Purdyi. The plants, however, are very different. I. Purdyi has scanty foliage instead of the dense masses of I. Douglasiana and the leaves have a polished upper surface. Another curious feature is that the central leaves of each tuft are

darker in colour than those at the outside. The short, unbranched stem is entirely hidden in short, bractlike leaves and bears two large, flat flowers in succession. The colour is a pale creamy yellow veined with red-purple on the falls and the flowers are very similar to those of I. bracteata. I. Purdyi can be distinguished at once, however, by the long yellowish-green tube more than an inch in length and by its broad, straight stigma lip, which is tongue-shaped in I. bracteata. The seeds, too, are cubical and not spherical as those of I. Douglasiana.

I. macrosiphon. Torrey, 1857. This "long-tubed" species is found scattered over a considerable area of Oregon and California. It grows abundantly on Mount Tamalpais across the bay from San Francisco.

I. macrosiphon is distinguished at once from all other Californian Irises by its long perianth tube, which is often as much as three inches long. The narrow, slender foliage is only about a foot in length and is either a bright green or distinctly glaucous. The stem is only two or three inches long and bears one or two narrow, reduced leaves. The colour of the flowers is very variable, being of all shades of blue- and red-purple and even white. In some districts the plants all produce flowers of the same colour, while in others each individual plant has flowers of a different shade. This fact is not surprising when we remember that the European species pumila and chamaeiris behave in precisely the same way. In all cases the flowers are

veined with delicate darker veins on a paler ground. The standards are somewhat shorter than the falls and usually of the same pale shade as the ground colour of the falls.

I. tenuissima. Dykes, 1912. A very "slender" species, known to occur only in Shasta Co., California.

This species is a very weak and slender grower and in this country, at any rate, was cut by late frosts. The stem is nearly a foot in length and the perianth tube one inch. The stem is not, however, closely sheathed in bractlike leaves as is that of I. Purdyi, with which the plant might be confused. Moreover, the flowers are much smaller with very narrow segments. The white falls are veined with yellowish-brown and have a waved edge. The standards are pointed, white with a few faint yellow veins running up the centre.

This description is taken from some plants which I raised from seeds collected by Miss Alice Eastwood in the same locality, from which the original herbarium specimens came. The longer stem, relatively shorter tube and the broad, rounded spathes seemed to separate I. tenuissima from I. macrosiphon. Its delicate constitution will probably prevent it from becoming common in this country.

The Longipetala Subsection.

There are at least four species in this subsection and they are all good garden plants that thrive in ordinary border soil. Unfortunately there has been, and there still is, very considerable confusion as to their names.

The only species, which is usually correctly named, is the true I. longipetala from the coast of California. It is a sturdy, vigorous plant with large flowers veined with violet on a white ground. It should be noted that its standards do not taper to a point at the upper end but are blunt and often indented in the centre of the broad end.

Very similar to the true I. longipetala is the upland form of the same species. It is built on much more slender lines but otherwise only differs in that the stems are distinctly longer than the leaves and the flowers smaller, though veined in the same way. A specimen preserved in the herbarium of the British Museum leaves no doubt that this is the plant which Nuttall called missouriensis and another specimen in the same museum shows that it is also the plant called I. Tolmeiana by Herbert. In gardens it is the Iris usually known as longipetala montana but which should rightly be called missouriensis.

Further confusion has been caused by the fact that both Nuttall's name of missouriensis and Herbert's name of Tolmeiana have been applied to a third species to which Nuttall gave a provisional name of montana, though he never actually published any description.

His specimen, however, is preserved in the British Museum and is quite distinct. This species has short, narrow erect leaves about equal to the stem and bears flowers of lilac or lavender, almost uniform in colour, except for the central area of the blade of the falls which is pale yellow.

The fourth species is arizonica, which I first raised from seeds obtained from Arizona. The growth is much more like that of longipetala than that of montana, except that the leaves are of a yellow-green instead of being distinctly glaucous. The flowers, however, are more like those of montana.

The four species may therefore be separated as follows :—

	Flowers veined with violet on white ground ; standards blunt.	1.
	Flowers lilac or lavender ; standards pointed.	2.
1.	Plants robust ; leaves equal in length to the stem.	I. longipetala (p. 123).
	Plants slender ; stems longer than the leaves.	I. missouriensis (p. 124).
2.	Plants robust ; 24 to 30 inches ; yellow-green leaves as long as branching stem.	I. arizonica (p. 125).
	Plants slender ; 12 to 18 inches ; glaucous leaves equal to unbranched stem.	I. montana (p. 125).

I. longipetala. Herbert, 1841. The coast of California, from San Francisco southwards to Monterey.

This is a very robust species and one that is easy to

grow in any good garden soil. As might be expected from a consideration of the climate of its native home, I. longipetala is practically evergreen, fresh leaves appearing in early autumn before the old leaves have died away. The colour is a dark green with glaucous grey tinge.

The leaves are two feet or more in length by an inch in width and are about equal to the stems, which bear several leaves and one or two lateral clusters of flowers besides the terminal head. Each spathe produces from three to six flowers in succession on long pedicels.

The large flowers are veined with violet on a white ground. The central ridge is thickly dotted with violet on a white ground and this dotted area spreads a little over the centre of the blade. The standards are very peculiar, being distinctly oblong and blunt at the upper end, with a shallow nick in the centre.

The seed capsule is thin-walled with six ribs and tapers gradually at either end. The seeds are smooth, dark brown and almost spherical. These characters seem to indicate an affinity to the Asiatic I. ensata (*see* p. 140).

I. missouriensis. Nuttall, 1834. The Rocky Mountains near the sources of the Missouri and all over the Great Basin to the west and south.

This is the upland or mountain form of I. longipetala and differs only in its more slender growth and in the fact that the stems are distinctly longer than the leaves. As we might expect of a mountain plant, it loses its leaves in the autumn and remains dormant until the spring.

I. montana. Nuttall. This is the name written on his specimen preserved in the Natural History branch of the British Museum. The species comes from the Rocky Mountains and from the country to the west and is the plant that is often grown in gardens under the names of Tolmeiana and missouriensis, to neither of which it has apparently any claim. It is also probably the I. pelogonus of Goodding, 1902.

This plant, like missouriensis, is leafless in winter and then in the spring sends up narrow, rather stiff glaucous leaves to the height of about fifteen or eighteen inches. The stem is about the same length and bears only a terminal head of two or rarely three flowers, each raised on pedicels about an inch or little more in length, whereas those of longipetala and missouriensis are much longer. The standards taper to a point above and are lance-shaped not oblong. The capsule is similar to that of longipetala but more slender and the seeds are of the same type.

The colour of the flowers is lilac or lavender. The standards are uniform in colour, while on the blade of the falls there are some slightly darker, diffuse or spreading veins on a lilac ground, beyond a central yellow patch.

This Iris, under the name of Tolmeiana, was crossed by Foster with longipetala and produced the well-known garden hybrid Tollong, which has the flowers of montana and the habit and vigour of longipetala.

I. arizonica. Dykes, 1917. The original plants on which the description is based were raised from

seeds taken from herbarium specimens collected in 1906 in the Barfoot Park at an altitude of 8,000 feet, on the Chiricahua Mountains in Arizona.

At first sight this Iris looks not unlike I. longipetala. It has the same tall, sturdy growth but the leaves are a yellower green and not so glaucous. Moreover, they die away in the late autumn and the plants then remain dormant until the spring. The leaves and the stems are about 24 to 30 inches long and the stems usually produce a lateral cluster of two or three flowers about six inches below the terminal spathe, which contains from three to five flowers. The flowers are much more like those of montana than those of longipetala. The lilac or lavender colour spreads all over the falls except for the yellow blotch at the centre and the slightly shorter standards are lanceolate without the notch of longipetala. The flowers are supported on slender pedicels over two inches long.

I. arizonica is thus practically a plant like longipetala with flowers like montana, but it differs from longipetala in that its leaves remain green until late in the autumn long after those of longipetala and then die away entirely instead of making new growth at once. It is not so decorative a plant as longipetala for the flowers are too small and narrow for the vigorous foliage.

I. arizonica in its general appearance and in its habit of growth is very like the Asiatic I. ensata. Both are natives of dry regions and have very long roots with the result that their foliage remains green in the driest of summers, long after other plants have suffered from the drought.

The Hexagona Subsection.

This small group of three species from the south-eastern United States seems to contain the nearest relatives of the European and Asiatic species of the Spuria subsection. The seed-vessels have double ridges at each angle but these ridges are less pronounced and set further apart than in I. spuria and its closely related species. The seeds, too, are different, for they are enclosed in a thick, corky husk that makes them appear larger than those of any other Irises. This corky husk has the same effect as the parchment-like envelope of the spurias, for it enables the seeds to float in water and to distribute themselves in this way over the marshes in which these Irises are found.

Though all three are marsh plants in their native homes, that does not mean that they will thrive in a bog garden in this country where they do not get the ripening in summer to which they are accustomed. The ordinary borders in our gardens usually contain enough moisture for them, except on hot, sandy soils, but I. hexagona itself wants a warm sheltered corner if it is to do well. I. fulva and I. foliosa will thrive in rather rich soil but they must not be allowed to become too parched at any time. They are best transplanted in August or early in September, when it will be found that root growth is active.

The three species may be separated as follows :—

All segments drooping; flowers terra-cotta.	I. fulva (p. 128).
Inner segments spreading upwards, not drooping.	1.

1.	Plant tall, stem rising above the leaves.	I. hexagona (p. 129).
	Plant dwarf, flowers low down among the leaves.	I. foliosa (p. 129).

I. fulva. Ker-Gawler, 1812. The banks of the Mississippi near New Orleans. So-called from the bright terra-cotta flowers.

I. fulva is one of the most distinct of all Irises. Its six segments all droop outwards at about the same angle, the flowers being produced from the axils of leaves of some length set at intervals on a stem rather more than two feet high.

The new growth begins early in the autumn and persists through the winter, so that the plants are only leafless for a short time about August. The leaves have the black dots, when held up to the light, which are characteristic of water Irises (*see* p. 10).

The slender rhizome is greenish-brown and shows very distinctly the ring-shaped scars, from which former leaves have been detached.

The colour of the flowers is unique among Irises and is the same both on falls and standards. The latter are blunt and not tapering and the style branches are very short with small crests.

At first sight the affinity of I. fulva to I. foliosa is not apparent but the two species agree in their seeds and capsules and also in the arrangement of the lateral buds in the axils of the leaves. An attempt at crossing the two produced two forms of the hybrid Fulvala, both with rich velvety falls, one a red-purple and the other of a bluer shade. The name was composed of

fulva and the first syllable of Lamancei, for I. foliosa was known at that time as I. hexagona var. Lamancei. The hybrids are excellent garden plants and flower more freely than either of the parents.

I. hexagona. Walter, 1788. The south-eastern United States, Carolina, Louisiana and Florida. So-called apparently by reason of the six-ribbed ovary.

This fine species bearing large lavender flowers on a three-foot stem is unfortunately not really hardy in this country. It needs a sheltered corner in rich soil, if it is to do well. The large falls are over four inches long with a blade two inches in width and the pointed standards are nearly as long but only half the width. The colour of the blade is the same as that of the falls but the haft is green. Albino forms with pure white flowers are not unknown.

The stem bears several heads of flowers each of which, except the topmost, springs from the axil of a reduced leaf.

The foliage is nearly two feet long and the plant owes its delicacy to the fact that new leaves grow in the autumn and consequently suffer in winter.

I. foliosa. Mackenzie and Bush, 1902. The south-eastern United States from Missouri and Arkansas to Texas. The name "leafy" expresses the habit of the plant which almost hides its large flowers among its abundant foliage.

This species is practically a dwarf counterpart of I. hexagona. The flowers are very similar but not

quite so massive. The stem, however, is only about a foot in length and zigzags slightly at each leaf, which contains a bud in its axil. The blade of the fall is a fine blue-lavender with a central patch of greenish white. An albino form is also known and, as in the case of I. hexagona, the central ridge is distinctly downy.

For cultivation, *see* the Introduction to the subsection.

Miscellaneous Beardless Irises.

When we have eliminated from the Apogon section the four great groups of the Sibiricas, the Spurias, the Longipetalas and the Californians, there remain a certain number of good garden plants and a few species, which have never been successfully introduced into cultivation and which are probably difficult, if not impossible, to establish here.

Of Garden Irises the most obvious are I. Kaempferi, the parent of the Japanese Irises, I. laevigata, with which it has long been confused, I. pseudacorus, our yellow river Iris and its American counterpart, I. versicolor. There remain also our other native species, I. foetidissima, which was thought always to have scarlet seeds but of which a variety with white seeds has recently appeared; I. ensata, one of the most widely distributed species in Central Asia and a relative apparently of the Longipetala group; I. setosa, probably the only species which is native both of Asia and America; I. unguicularis, the Algerian Iris so valuable

for providing us with flowers in the open in mid-winter ; I. ruthenica, a pretty little species from Hungary, the Altai region and south-western China and I. verna, the American species, which looks like a pumila but has no beard.

These will all be described in detail but mention must be made here of the other species, which are introduced into our gardens from time to time though they never seem to repay the trouble that we take over them.

I. Grant Duffii, Baker (1892), is a curious Iris which was first described from plants found by General Grant Duff on the plains of Esdraelon, in Palestine. It has long, narrow, rather stiff leaves and a most venemous rhizome, thickly set with the spiny remains of the leaves of former seasons. The rhizomes cannot be handled without leaving in the hands a number of these spines which are exceedingly painful. The flowers, which are extremely rare in this country, are yellow with a few small spots or dots of dark purple. I. Aschersonii, Foster (1902), is an Asia Minor relative of this Iris with rather greenish-yellow flowers edged with black spots and the very similar I. melanosticta, Bornmuller (1907), comes from the Hauran beyond the Jordan. I. masia, Foster (1902), is a purple flowered variety, probably of I. Aschersonii, found by Sintenis in 1888 near Suverek in Asia Minor.

Three small Chinese species, I. Grijsi, Maximowicz (1880), from the Central Provinces, I. Rossii, Baker (1877), from Corea and north-eastern China, and I. Henryi, Baker (1892), from the middle Yangtse near Ichang, have never apparently been in cultivation.

I. Grijsi is remarkable for its habit of producing twin stems side by side, I. Rossii looks like a very free-flowering little I. ruthenica with a long perianth tube, while I. Henryi might well be a relative of, or even identical with, I. minuta, Franchet et Savatier (1879). This curious little yellow-flowering species, which is apparently only known as a cultivated plant from Japan, sometimes does well in light, rich soil in rock gardens in this country and flowers in April or May. The blade of the fall is rounded and marked with brown on a yellow ground and the short standards are also pale yellow. When the flowers appear on very short stems, the leaves are only a few inches long but grow eventually to about a foot in length. Nodules, like those on the roots of leguminous plants, appear on the roots of this species in autumn but their use is unknown.

Three Asiatic species, I. tenuifolia, Pallas (1773), I. Bungei, Maximowicz (1880), and I. ventricosa, Pallas (1773), have occasionally been introduced into cultivation but, though the plants have lingered on for some years, I have never known them flower. Of tenuifolia I raised seedlings from imported seeds but they were slower growing than any other Iris I have ever seen and showed no sign of flowering even after several years. This was the more disappointing because the plants seemed quite healthy. I. tenuifolia extends from the Volga through Turkestan into Mongolia and must be not unlike I. unguicularis. I. Bungei, from Mongolia, has a short stem and is intermediate between I. tenuifolia and I. ventricosa,

which has broad spathes, covered with a curious network of fibres.

The most important of these miscellaneous beardless Irises may be recognized as follows :—

I. Kaempferi and I. laevigata.

The persistent refusal of both gardeners and botanists to recognize the difference between these two species is most remarkable. I. Kaempferi is the Iris which, in the hands of Japanese cultivators, has given rise to an enormous number of garden varieties, in many of which the styles have been more or less converted into petals and the flowers have consequently become double. The standards also have in many cases ceased to be erect and have become almost as wide as the falls.

A similar fate has overtaken I. laevigata but in a lesser degree. There is in Japan a form with six or more petals, all looking like falls, of white spotted with blue as well as the single form of this colour which was described as a species under the name of I. albopurpurea.

One curious fact is that both species grow in the Amur district of Manchuria but they can be separated at once by the fact that the leaves of I. Kaempferi have a raised midrib, while those of I. laevigata are smooth. It is possible that the name laevigata was given because of this character of the leaves or it may refer to the smooth, shiny, fawn-coloured seeds. Another difference is that the standards of laevigata are as long as the falls while those of Kaempferi are very much shorter.

The seeds of the two species are very different, those of I. laevigata being thick, flat, and semi-circular with shiny light brown skins, and those of I. Kaempferi thin, almost circular discs. The capsules of I. laevigata are oblong, about three times as long as they are wide and the pedicels which support them are short, less than an inch in length. On the other hand the capsules of I. Kaempferi are short and broad, almost globular in fact, and the pedicels may be several times as long as the capsules themselves.

There is another great difference which it is well to remember if the plants are to be cultivated successfully. I. laevigata is a true bog plant and will flourish where it is wet all through the year. I. Kaempferi, on the other hand, is not really a bog plant and should be kept comparatively dry, except when growth is active. Moreover, the colour of the wild plants is quite different; laevigata is a fine blue-purple, while Kaempferi is a deep rich red.

The two plants may therefore be separated as follows :—

I. Kaempferi; leaves with distinct midrib; standards much shorter than the falls; capsules short and broad on long pedicels; seeds thin, round,

I. laevigata; leaves without raised midrib; standards nearly as long as falls; capsules oblong on short pedicels; seeds thick, semicircular.

I. Kaempferi. Siebold, 1858. Manchuria, Corea and Japan. Named after Kaempfer, the German physician and traveller, who lived in Japan from 1690 to 1692.

The wild plant has leaves up to two or two-and-a-half feet in length and the stem is nearly as long. The leaves may be nearly an inch in width and have a prominent raised midrib through their whole length. There is usually a side branch with two flowers as well as the terminal head.

The falls have a short narrow haft and a large oval blade of deep red-purple with a small yellow streak, not projecting far beyond the style branches. The standards are not much more than half the length of the falls and of the same colour.

The process by which the Japanese have evolved from this wild plant the innumerable single and double varieties of all shades of blue and red-purple, pink, lavender and white is quite unknown. It is one of those plants, like the chrysanthemum and the flowering cherries, on which the Japanese gardeners have for centuries concentrated their skill and exercised their patience with results that are truly astonishing.

No attempt will be made here to give lists of named varieties because no two catalogues seem to agree. The list recently published by the American Iris Society gives about 800 names but, as no description of the flowers is attempted, it is of course, impossible to say whether that number of distinct varieties exists. Where seedlings are raised in large numbers it will be found that many of them are single plants, practically identical with the wild type, and an albino single form with just a touch of yellow on the blade of the falls is also very common.

With regard to cultivation, the secret is to manure

the plants heavily with farmyard or liquid manure during the resting period in winter and to keep them at the same time comparatively dry, by planting them in raised beds and drawing the water away from the channels between them. Then when growth begins in spring, manuring should stop and the channels be filled with water. When the plants become too thick and crowded, they should be lifted, carefully divided and replanted at once, and the best time for this operation is immediately the flowers are over. Planting may also be carried out in spring, when growth is just beginning. The soil should be rich and heavy rather than sandy but must not contain lime.

I. laevigata. Fischer, 1837. Eastern Siberia, Manchuria, Corea and possibly Japan. The name "smoothed" may refer to leaves, which have no midrib, or to the seeds.

This is, to my mind, the finest blue Iris that we possess and one that deserves to be far more widely known and cultivated. It has long suffered from confusion with I. Kaempferi but no one who has once grown the two side by side can ever confuse them again.

The stem is about eighteen inches long, not so straight as in I. Kaempferi but inclined to zigzag and bears a side-head of flowers when growing vigorously. The large green spathes usually contain three flowers and have the inner valve much longer than the outer. The large oval blade of the fall is a deep blue with small central yellow streak. The standards are nearly

as long and of the same colour. The capsule and seeds have already been described.

Nothing could be finer than the wild plant and a good contrast to it is the white variety. Another in which the white flowers are more or less heavily spotted and blotched with blue has been evolved in Japan and seems to breed true. The Japanese have also succeeded in doubling all these varieties, so that they have monstrous flowers with six or eight petals, all looking like falls but such freaks are more admired by the Japanese with their love of the grotesque than by gardeners in this country.

I. pseudacorus and I. versicolor.

If similarity of seeds is an indication of affinity, then the nearest relatives of I. laevigata are our native I. pseudacorus and its American cousin, I. versicolor. These two species appear to be very closely related, for, if we disregard colour, the only difference is in the shape and size of the standards, which in pseudacorus are very variable. Even here, however, the two plants agree in that their standards always have at their base two lateral wings.

I. pseudacorus. Linnaeus, 1753. So called to distinguish it from the sedge, Acorus Calamus. It is found in marshes and along streams all over Europe, in North Africa, Asia Minor and Syria and also in Siberia.

This well-known water Iris is probably of very ancient origin. Many attempts have been made to

cross it but the seedlings have almost invariably been merely pseudacorus. One plant, however, is known to exist, which can only be a hybrid between pseudacorus and versicolor. It has flowers closely speckled with blue-purple on a yellow ground and its hybrid origin is doubtless the cause of its sterility. I. pseudacorus is also found in a fossil state and I have seen specimens which were found at a considerable depth in the excavations for Immingham Docks.

The tall branching stem is about three feet high and so also are the leaves, which have a conspicuous, raised midrib. The yellow flowers have large, almost circular blades to the falls and there is often a central patch of brown-purple veining. I have raised seedlings without any veining from wild specimens which were heavily marked and the pale yellow variety, sometimes known as Bastardi, also appears occasionally among seedlings.

A peculiarity of the species is the amount of variation in the shape and size of the standards. They are usually about an inch in length with a small concave blade but they are sometimes reduced to minute points.

The large oblong capsules are not unlike those of I. laevigata and the smooth, light brown seeds float in water and thus aid the distribution of the plant along the banks of streams.

The large, stout rhizome is very tough and fibrous and of a pink colour inside. It will thrive in marshy ground where few other Irises can exist.

I. versicolor. Linnaeus, 1753. The exact meaning of the name is not obvious. It is hardly likely that

it was given merely because colour varieties were known, for each of these was named as a distinct species, *e.g.* virginica. Probably the Iris was called parti-coloured because the colouring varies in different parts of the flower. I. versicolor is found in swamps and by streams all through eastern Canada and the eastern United States from Hudson Bay to Texas.

I. versicolor is practically a purple counterpart of I. pseudacorus, except that the standards are lance-shaped and a little more than half as long as the falls, and that the leaves, though thickened along the middle, have no distinctly raised midrib. The haft of the falls is veined with purple on a yellow ground, which fades to white on the blade. Beyond this white area the purple veins run together and the whole circumference of the blade is purple. The exact shade of purple may be either a dull slate, a blue or a rich red. The latter is sometimes known as the variety kermesina and breeds true to the colour when two red-purple examples are crossed. A number of variations in size and colour occur in the wild state and one of the most distinct is a dwarf plant with good blue flowers which came from Newfoundland.

Cultivation is as easy as that of I. pseudacorus and both these bog plants may be grown in the ordinary border, provided they are heavily mulched in summer and not allowed to get too dry.

I. ensata. Thunberg, 1794. It is uncertain to what character this Iris owes its name of "sword-like."

It may be to the stiff, erect young leaves, when growth first begins in spring or to the lance-like blades of the falls.

The species is very widely distributed, from the Altai region and Chinese Turkestan through Kashmir and Tibet to Manchuria, north-eastern China and Corea. There are undoubtedly two or three distinct varieties but, owing to the fact that the species is of some economic value both as a fodder plant and as a source of fibres that can be twisted into twine, the present distribution of the various varieties is very likely due to man rather than to nature.

The most characteristic feature, by which all the varieties may be at once recognized, is the long, narrow ovary with six longitudinal ridges placed at equal intervals round it. The fullgrown foliage of all varieties is very long and narrow and, as the plants root more deeply than any other Iris except arizonica, they are able to withstand more drought and to remain green, when every other perennial is dried up and parched. It is not until the frosts of October and November that the leaves turn yellow and die even in the driest season. As soon as the weather becomes at all mild in the early spring, the leaves begin to grow rapidly and are usually pale yellow and only turn green later. At this stage they are frequently cut by late frosts. In Asia the flowers probably appear very early, almost as soon in fact as the snow melts and the young leaves push up. In this country they usually do not appear until the plants are further developed. The stems may be very variable in length,

sometimes only an inch or two but usually more nearly a foot ; they are not round but somewhat flattened. The narrow, green spathes contain several buds and the flowers are produced in succession on pedicels of varying length up to as much as three or four inches. The capsules are long and narrow and the seeds smooth, dark brown and either spherical or slightly pear-shaped, closely resembling those of the longipetala group (*see* p. 124).

There are three main varieties of I. ensata :—

I. This, the commonest, has narrow, pointed fall-blades and very long leaves. The colour of the flowers is usually some shade of light or dark, rather slaty blue, but sometimes white. This form is found in Japan, Shantung and in the Kashmir valley near Srinagar.

II. A second variety, grandiflora, has much larger flowers, produced when the leaves are still short and veined at the centre of the blade of the fall with pale violet on a creamy ground. This is the form that is found in Tibet and in the mountains of Western China.

III. The third variety has twisted leaves and flowers not unlike those of the first but with more veining on the blade of the fall. This variety grows near Pekin.

Except in the case of II, the flowers are disappointingly small and narrow for the size of the plant and the vigour of the leaves. There is no difficulty in the cultivation of I. ensata except that II is apt to have its buds frost-bitten before they open. All the forms seem able to grow in any soil that is not water-logged and any one who has tried to dig up an old and

long-established clump will admit that this Iris takes a most tenacious hold of the soil.

I. foetidissima. Linnaeus, 1753. So called from the smell of the bruised leaves, which closely resembles that of the foliage of Clerodendron foetidum. It is a native of this country and of the Mediterranean basin.

This is one of the few Irises, which flourish in the shade and is often found growing in woods and copses. It has broad, polished evergreen leaves but all attempts to convey this character to hybrids by cross fertilization have so far been in vain, for I. foetidissima refuses to allow itself to be crossed with any other species. The flowers of the typical plant are very inconspicuous, for they are of a dull purplish grey, so that they often come out and fade unnoticed and it is not until the seed pods burst open in the late autumn and display their scarlet seeds that it is realized that the plants have flowered at all. It used to be thought that the seeds were always scarlet but a year or two ago I received some white seeds. I have raised plants from them but they have yet to flower. A curious feature is the way in which the seeds remain attached to the three valves of the pod. In all other species the seeds are loose when the pod opens.

Besides the typical form, there are at least two varieties with yellow flowers, which are more desirable as garden plants. Both are capable of breeding true when self-fertilized and it would probably be worth while to cross the three forms and to raise seedlings

with a view to obtaining a good flower as well as the evergreen foliage and the scarlet berries, which are valuable in winter.

Of the yellow-flowered forms, the smaller is of a light lemon and the other with slightly larger flowers has a good deal of light-brown veining on the pale yellow ground.

The branching stem is about 18 or 20 inches long and bears two or three heads, each consisting of two or three flowers, which open in succession.

I. foetidissima grows and increases slowly for an Iris, especially in the shade and must not be expected to flower as freely there as it does when grown in full sun. There is a form of this Iris with variegated foliage in which there is a pale yellow stripe down the inner side of each leaf. The flower is a dull leaden-purple.

I. setosa. Pallas, 1820. So called because the standards are reduced to fine points, less than an inch long. The distribution is very unusual, for it is found growing in Northern Siberia, Japan, Sakhalin and Kamchatka and also in Alaska, Labrador, and on the coast of Maine.

This curious species may be very ornamental as a garden plant and grows well in rather moist, rich soil. It is very floriferous and, though some forms are two feet or more in height, others are very dwarf. The colour may be either a light purplish-blue with inconspicuous darker veins or of any deeper shade and is sometimes even tinged with red. A rare white form has been found in Japan. The blade of the fall is

either round or heart-shaped and there is an area near the end of the short style branches, where the white ground shows clearly between the veins.

The standards are of two forms. They either narrow suddenly just above the base and then taper to a point or else after contracting slightly they expand again gradually and then contract sharply to a short fine tip. As far as I know, these two types of standard are found in all the local forms of the species.

The broad foliage is often stained with deep purple at the base and is slightly shorter than the stems. The inflated capsules have a deep groove on each of the three sides and the numerous smooth, glossy brown seeds have a ridge down the sides and are unlike those of any other Iris. When they are ripe, they detach themselves from the walls of the capsule and rattle inside it when the stem is shaken.

A dwarf form which has been described under the name of arctica, comes from Alaska and is very similar to that which grows in Labrador.

The only other non-bulbous Iris in which the standards are known to be reduced to mere points is I. tripetala, Walter (1788), from Florida, Tennessee and Carolina. The blue-purple falls are veined and mottled and resemble those of I. setosa. The foliage, however, is linear and much narrower and the seeds are thick, flat discs. This Iris will not flourish in the open in this country but must be grown in a greenhouse.

I. unguicularis. Poiret, 1785. The species owes its name apparently to the narrowness of the bases

of the segments of the flower. The botanical name for the narrow, lower end of a petal is *unguis*, a nail or claw, and *unguiculus* is a small or narrow nail or claw. The more euphonious but unfortunately younger name of stylosa was given by Desfontaines in 1798 to mark the fact that the style, before it separates into three branches, remains united in a column for nearly an inch above the bases of the segments of the flowers. The typical plant comes from Algeria and forms of it are found in Greece, both on the mainland and on the islands and also in Asia Minor and northern Syria. The variety lazica, Albow (1895), comes from Lazistan at the south-eastern end of the Black Sea.

In the common Algerian form the leaves grow about 18 or 24 inches in length and are a little more than half-an-inch broad. The stem is very short and hidden at the base of the leaves, the flowers being raised by a perianth tube six or more inches long. Consequently, the seed vessels are to be found at the ground level at the base of the leaves and take a long time to ripen owing to the fact that not much sunlight can reach them.

The colour of the flowers varies a good deal and so does the time of flowering of the individual plant. The weather also is bound to influence a plant which should be in flower in the open at Christmas. After a hot, dry summer the flowers are usually abundant and the first appear in October, while after damp, sunless seasons none may appear until February.

The flowers are relatively large. The spoon-shaped blade of the fall stands out almost horizontally and is of a bright lilac colour, with a small central area which is veined with deep lilac on a white and faint yellow ground. The standards, like the falls have narrow hafts and broad blades of the same colour as the falls. A most beautiful feature of all forms of this Iris is to be found on the narrow style branches which seem to be sprinkled with gold dust.

There are in cultivation several ivory white varieties, which have a conspicuous yellow band on the blade of the falls. One of these white varieties is usually as early to flower as any but there are others, which do not come into bloom till February and March.

In Greece there is a variety, sometimes apparently known as speciosa, of which the foliage is rather short and scanty and of which the flower is easily to be recognized by its dark, rich colour, by its strong scent of honey and by the ring of bosses which encircle the tube at the base of the segments of the flower.

In Crete there is a small variety with narrow leaves and in Asia Minor another with extremely narrow, almost threadlike leaves and pale much-veined flowers. These small forms seldom flower freely until March or April.

From the island of Cephalonia I once received a few plants of a very dwarf variety with some variation in the shade of purple in the flowers. A cross between this and the variety cretensis produced a series of colour forms, with foliage about a foot in length which flower very freely and make delightful plants for a rock garden or sloping bank.

The variety lazica has short, broad foliage, which is liable to be damaged by frost, and dark blue-purple flowers of no great beauty. As far as my experience goes, it is not nearly so desirable a garden plant as the Algerian type. It may be separated botanically by its short perianth tube and stem a few inches long.

To make the typical Algerian variety flower freely, it should be grown close up against a sunny wall, in soil with which a large proportion of old lime rubble has been mixed. If the wall is that of a greenhouse, which hot-water pipes always keep warm, the plants will be very happy and respond to the treatment by flowering profusely all through the winter months.

The best time at which to move I. unguicularis is as early in September as the soil is thoroughly moist. The clumps should be replanted in good-sized pieces and not separated into single rhizomes. Transplantation can also, if necessary, be carried out with success in March or early April but care must then be taken to see that the soil is never allowed to become too hot or dry until the plants have thoroughly re-established themselves. Even so, it is doubtful whether anything is gained by planting in the spring instead of waiting till September when clumps can be moved so that they hardly feel the check at all. In fact, they will often flower the same winter.

I. verna. Linnaeus, 1753. The spring-flowering Iris from the south-eastern United States from Virginia to Alabama

This small species seems to be the one approach to

the development of a bearded Iris that is found in America. It has every appearance of a small pumila or chamaeiris except that there is no visible beard but merely a pubescent orange band on the falls consisting of short unicellular processes.

The leaves are about six inches long. The stem is very short and the perianth tube between one and two inches. The blade of the fall is of bright lilac-blue, except for the central orange band, and the standards are of the same colour.

I. verna deserves to be much more widely grown than it is. In my experience, it does best in rather moist, peaty soil in a half-shady position. This does not mean that it should be wet in winter, for it probably needs to be kept fairly dry then.

I. ruthenica. Ker-Gawler, 1808. So called from its home in the country of the Ruthenes in Transylvania and Roumania, this Iris is also found in the Altai region, in Turkestan and in many parts of China.

This remarkable little species is quite unlike any other known Iris and deserves to be much more widely grown, either in the rock garden or in the front of borders, for it is never more than about eight inches high. The reason that it is so seldom seen is probably that it does not lend itself to the ordinary practice of moving Irises in the autumn. I. ruthenica can only be moved with success when it is in full growth in spring and summer. Another reason that may have made it unpopular is that some forms of this Iris are

scarcely ever known to flower in this country. On the other hand the most accessible form, namely that from Transylvania, flowers profusely and has comparatively large flowers with oblong falls extended almost horizontally and very prettily veined and shaded with dark blue-purple on a white ground which extends all over the blade except at the extreme edge. In the centre of the flower the dark blue standards and the large crests of the slightly redder style branches rise almost to the same height.

The seeds of this Iris are very distinct and unlike those of any other species, for they have, when fresh, a curious white excrescence which extends nearly halfway round their circumference. It is, however, only conspicuous when the seeds are quite fresh, for it soon shrivels and disappears. Another curious habit of this Iris is that the almost spherical capsules open widely as soon as they are ripe, so that the seeds are at once dispersed. The seeds germinate readily and plants are easily raised.

The foliage of the Transylvanian form is thin but fairly rigid with a glossy upper surface and standards nearly erect. Other forms have more prostrate tufts of narrower and less rigid leaves. The stems vary in height from an inch or two to six or eight inches and bear a single head of two flowers.

I. ruthenica grows readily in any good garden soil, that is not too dry, when growth is active in spring and early summer.

XII.

The Oncocyclus Section.

The Irises of this section produce flowers which are no less weird and wonderful than the name of Oncocyclus, of which no explanation has ever yet been given. Its author says that it was derived from two Greek words but refrains from saying what meaning he attached either to them or to the compound which he made of them. There is, however, obviously a reference to something circular and the name may have been given with reference to the broad circular white collar, which is so marked a feature of the seeds at the point by which they are attached in the seed vessel.

All the species of this section possess seeds of this character and, except for differences in size, it is impossible to draw any distinction between those of the various species. This seems to point to the inference that the section is of comparatively late development in the history of the genus,—an inference which is supported by the fact that the various species are very local in their distribution. Indeed the whole section is confined to Asia Minor and Syria and the mountainous regions to the south of the highest peaks of the Caucasus and in the west of Persia.

No oncocyclus species produces more than one flower on each stem and the outer leaves in each tuft are usually more or less curved or falcate. The rhizomes are covered with a characteristic light reddish skin and are usually, though not in all cases, inclined to spread by means of stolons, the ends of which swell and develop into new rhizomes.

The difficulty of the cultivation of these Irises in this country arises from the fact that they are all natives of regions where there is only a short wet season, during which growth is necessarily rapid, and a long resting season, during which the soil in contact with the rhizomes and roots is quite dry and warm. The main roots are thick and probably remain unbranched until the autumn or winter after their formation in the late spring. Some species, such as I. Mariae from the frontier between Egypt and Syria and probably also I. susiana, are natives of regions, where the only moisture comes from winter rains and these are therefore apt to grow early in the autumn in this country. The young growths then suffer in the winter and the plants are weakened and often collapse. It is only in exceptionally mild seasons or in exceptionally sheltered positions that these species can be expected to survive and flower. Some species, on the other hand, such as I. Sari from the mountains of Cilicia and I. acutiloba from the Caucasus region, are probably frozen in the autumn before any rain comes and then covered deep in snow during the winter and only make their growth in spring. Such species should be more easy to manage and, as a matter of

fact, I. Sari has been known to survive and flower in Surrey for more than ten years.

There has been much controversy as to the best method of cultivating these species. There is no doubt that in their native homes they probably grow for the most part in heavy soil and particularly in that heavy red soil, which is found among the rocks in limestone districts in Southern Europe. In this country such soil is too wet in winter unless indeed the beds are arranged on so sharp a slope that all moisture drains rapidly away or unless some artificial means is provided for keeping off the rain.

The soil therefore for Oncocyclus Irises must be well drained and it should be made porous by a liberal admixture of lime rubble, for these species require lime in the soil. Fresh manure is, of course, inadvisable, but it is useless to expect a plant to make vigorous growth in a comparatively short season in poor, barren soil. The soil should be fertile and in good condition and a sunny position against a wall facing south is the best situation for these Irises.

The rhizomes may be planted in October and should flower in April and May. They should be dug up again about the middle of July and then stored in absolutely dry sand in a sunny shed or greenhouse, where they will remain dormant until the planting season comes round again in October. It is important to preserve intact the new root fibres, which should remain unbranched until growth begins again on replanting. Another possible plan is to pack up the rhizomes in September before there is any sign of

growth and keep them in cold storage at a temperature of about 32 degrees Fahr. until March and then plant them out.

The nomenclature of the various species is extremely difficult owing to the fact that there are several which appear to differ only in colour and not in structure or in any other botanical character. Whether we group such plants together under one specific name or give a name to every colour-form depends on our conception of the nature of a species. The truth seems to be that in each locality there is a local form and it would be a mere multiplication of names to give a different specific name to each one.

These Irises must be a wonderful sight in some regions, for I have met travellers who have told me that they have seen miles of country covered with one or two forms in the Moab region beyond the Jordan and they evidently struck the Egyptian invaders of Syria, for the earliest known representation of Irises occurs on an Egyptian bas relief of Thothmes III which must date from about 1500 B.C. This Pharaoh cultivated in Egypt a " Syrian Garden " of plants brought back from expeditions to that country and among those represented on the relief are obviously two Oncocyclus Irises. They have the stem bearing a single flower and a reduced leaf, while the flowers have the relatively large standards and the small, much recurved or tucked-in falls, characteristic of the Oncocyclus Irises.

Although Clusius mentions that I. susiana was obtained from Constantinople as early as 1573, On-

cocyclus Irises were probably but little cultivated in Western Europe until the latter half of the nineteenth century when Max Leichtlin in Baden Baden, Sir Michael Foster at Shelford, near Cambridge, and the Rev. W. Ewbank at Ryde, in the Isle of Wight, succeeded in introducing into cultivation a number of species from Asia Minor, Persia and Syria. Foster was probably the first to attempt to combine the Oncocyclus species with the more easily cultivated Regelias and Pogoniris. In the first case he was followed by the firm of C. G. van Tubergen, in Haarlem, who evolved the numerous Regeliocyclus Irises, while in the latter he succeeded in raising hybrids of I. iberica × I. pallida, I. paradoxa × I. pallida and of I. iberica × I. variegata, which have proved admirable garden plants. Of iberica × pallida there are at least six or seven different varieties in cultivation, all of which are strong, sturdy growers in good soil. Foster himself told me that these were the survivors of some fourteen seedlings which he succeeded in raising. They approach much more nearly in size to I. pallida than to I. iberica but the large flowers show distinct traces of the veining and conspicuous signal blotch of the Oncocylus parent. In my experience these hybrids are shallow rooting and will not continue to do well unless they are replanted every second or third year, either immediately after flowering, if they have only to be moved from one bed in the same garden to another, or else towards the end of August or early in September.

The Regeliocyclus Irises afford a striking example of successful hybridisation, for they combine something

of the form and beauty of the Oncocyclus species with the ease of cultivation of the Regelias. The one essential point in their cultivation, at any rate in this country, is that they should be dug up every year about the middle of July, stored in a dry, warm place until about the second week in October and then replanted in light, rich soil containing a fair proportion of lime rubble (*see* also p. 168).

Of the large number of Regeliocyclus varieties which have been named and put into commerce, some of the best are :—Isis (Korolkowi violacea × iberica van Houtteana), Charon and Isolda (Korolkowi concolor × atropurpurea), Aspasia (Korolkowi concolor × Mariae), Hera (stolonifera × oncocyclus) and Luna. Mr. C. G. van Tubergen has recently published the parentage of these hybrids in a paper included in the report of the Iris Conference held in Paris in 1922. It is also stated there that the fine hybrid Aphrodite was raised by crossing Lorteti and Gatesi, and it is remarkable that a hybrid between two Oncocyclus species should be as easy to cultivate as any of the Regeliocyclus varieties.

The determination of the various species or local forms of Oncocyclus Irises is an extremely difficult matter, for there are scarcely any definite structural characters to differentiate them. In fact among the larger species of which susiana and Lortetii are typical there seem to be no differences except those of colour. These and the other stout-growing Oncocyclus species, Gatesii, Bismarckiana, sofarana, and atrofusca might therefore almost be looked upon as local, colour forms

of one species. The smaller species may be separated as follows :—

	Outer segments or falls concave.	I. iberica (p. 160).
	Outer segments or falls convex.	1.
1.	Outer segments short, narrow and strap-shaped, almost entirely covered with short stiff hairs.	I. paradoxa (p. 161).
	Outer segments with a blade broader than the haft.	2.
2.	Flowers uniform in colour.	I. atropurpurea (p. 158).
		I. Barnumae (p. 158).
		I. Mariae (p. 159).
	Flowers conspicuously veined.	I. acutiloba (p. 156).
		I. meda (p. 161).
		I. Sari (p. 162).

I. acutiloba. Meyer, 1831. The mountainous region to the south of the Caucasus and round the southern end of the Caspian. The name was given on account of the narrow, pointed segments of the flower.

This small species grows about six to nine inches high and has narrow, pointed falls with a dark signal patch and larger, closely veined standards. The veins and blotches are usually of a brown-purple colour on a creamy white ground.

To face p. 156

I. acutiloba x I. Korolkowi.

(Two-thirds natural size).

There is no doubt that there are a very large number of differently coloured but obviously closely allied Irises in this mountainous region, to which some will give different names and which others will group together under one specific name. Thus I. Ewbankiana was described by Foster as very similar to I. acutiloba and differing chiefly in the falls which extend horizontally instead of reflexing. When, however, we remember how seedlings of I. pallida, for instance, vary in this way, it seems inadvisable to give specific rank to each small variation. An I. Schelkownikowii has also been described by Fomin and I have seèn drawings from Tiflis of at least six forms, which differ only in having variously coloured grounds under the brown-purple veining. The ground may be either dark brownish-purple or lilac or even almost white. The broad beard is composed of densely set hairs, which are yellow in the lighter forms and yellow tipped with brown in the darker.

I. atrofusca. Baker. A native of Palestine. A dusky blackish Iris.

This is a somewhat dingy-coloured Iris and is probably identical with one which was for some years obtainable under the name of I. Haynei. The large flowers are closely veined and dotted with reddish-black on a ground which is yellowish in the falls and grey in the standards. The centre of each thick vein is black but its edges look red when a petal is held up to the light. The foliage is broad, similar to that of I. susiana and not noticeably falcate.

I. atropurpurea. Baker, 1889. A native of Syria, probably in the country immediately to the east of the Jordan.

Of this species the somewhat scanty foliage is very falcate, the leaves being not much more than six inches long at flowering time. The rounded standards are of a dark reddish-black on which the black veins are inconspicuous. The falls are narrower and more oval in outline, of a deep, almost black colour. There is a central region along the haft where the scattered, yellowish, black-tipped hairs of the broad beard stand out from a greenish-yellow ground. In front of this there is a conspicuous, velvety patch of dense black.

I. Barnumae. Foster and Baker, 1888. This was named after Mrs. Barnum of the American Mission at Kharput, by whom plants were sent to Foster. It is a native of the mountains of north-eastern Asia Minor, near Lake Urumiah.

I. Barnumae is distinguished from most other Oncocyclus species by its self-coloured flowers. These are wholly of a dark vinous red colour with rounded segments, the standards being merely of a slightly paler shade than the falls. There is none of the coarse, conspicuous veining and dotting which occurs on nearly all the other species.

Yellow flowered forms have been described under the names of I. urmiensis and of I. chrysantha, but Foster received both yellow and purple forms from Lake Urumiah and there seems no reason to doubt that this species is as variable in colour as I. chamaeiris or I. pumila.

It is difficult to separate from I. Barnumae an Iris which has been described as I. Mariae and which grows at El Arisch on the frontier between Egypt and Palestine. The self-coloured flowers are of some shade of lilac or red-purple and the plant has the narrow glaucous foliage of I. Barnumae. Only the outer leaves in each tuft are curved or falcate. Some rhizomes which were collected by Major F. C. Stern at El Arisch about 1916, during the advance of the British Forces from Egypt into Palestine, are still in cultivation in pots in this country and flower annually.

I. Bismarckiana. Dammann, 1890. A species from Northern Palestine.

This is a large plant, similar in growth to I. susiana and I. Lortetii, from which it differs only in its colour scheme. The large round standards are densely veined and dotted with blue on a creamy-white ground, while the falls are dotted all over and veined near the edge with black-purple on a creamy-yellow ground. There is a velvety black blotch on the falls and the beard is composed of purple-black hairs on a pale yellowish ground.

I. Gatesii. Foster, 1889. This was named after the Rev. T. J. Gates of the American Mission, at Mardin, in Northern Mesopotamia, and is a native of Kurdistan.

I. Gatesii has probably the largest flowers of any known species, for the rounded standards are five inches in diameter and the falls are almost, if not quite, as

broad. The ground colour is a pale greenish or grey-white, closely marked with fine purplish veins and dots. The broad beard is composed of scattered greenish hairs and there is a small purplish blotch on the falls.

I. iberica. Hoffman, 1808. A native of the Caucasus, Armenia and Northern Persia.

This species is easily recognized and separated from the others by its concave or spoon-shaped falls. The standards are either white, or pale yellow in the variety ochracea, faintly dotted and veined with purple-brown. The falls are circular or rounded oblong and are closely covered with a network of brown-purple veins. The beard is of short brownish hairs and there is beyond it on the blade of the falls a velvety blotch of purple-black. There are several forms of this species whose differences are chiefly due to the exact shade of colour in the veins and the ground may sometimes be lilac instead of white or yellow. The stem is from three to six inches high and the glaucous foliage is very falcate.

I. Lortetii. Barbey, 1881. Named after Dr. Lortet, of Lyons, who found it growing on the southern slopes of Lebanon in thickets of the cochineal oak, Quercus coccifera.

This is one of the most beautiful of all Irises and owes its beauty to the wonderful colouring. The rounded falls are closely and minutely dotted with crimson on a creamy ground and there is a central blotch of dark crimson. The beard is of scattered,

brownish hairs. The large standards are finely veined with reddish-violet on a white or pale lavender ground.

The foliage is broad for an Oncocyclus Iris and erect rather than falcate. The stem is nine inches to a foot in height.

I. meda. Stapf, 1885. A native of Central Persia, the home of the Medes.

This is a small species with a stem about four inches high. It is not unlike I. acutiloba except that the segments are more rounded and it differs from I. Barnumae in having a network of thick purple veins. The falls are either lilac-purple or greenish-yellow with a yellow beard and dark blotch and the standards of a slightly paler shade of the same colour as the falls.

I. paradoxa. Steven, 1817. Northern Persia, Armenia and the neighbourhood of Elizabethpol, in Transcaucasia.

This is one of the most extraordinary of all Irises and deserves its name, "The Unexpected." The standards are orbicular and closely veined and dotted with dark blue-purple on a blue or white ground. The form with the white ground is known as the variety Choschab and comes apparently from the southern shores of the Caspian.

The falls are narrow and strap shaped, about two inches long and half to threequarters of an inch broad, with a rounded end. The ground is usually a pale pinkish-crimson and it is closely covered with dark purplish-black hairs so that it looks and feels like velvet.

The extreme tip is heavily veined on the pink ground, which appears as a narrow band separating the veined area from the velvet.

I. paradoxa was crossed by Foster with pallida and variegata and in both cases its influence produced the characteristic velvety appearance on the falls. It has also been used in some of the Regeliocyclus hybrids and the result is always a flower in which the falls are noticeably narrow and oblong in outline.

I. Sari. Schott, 1876. A native of Cilicia and central Asia Minor, where it was first found by Kotschy in 1854, near the river Sar.

This species is intermediate in size between the small species of the Caucasus, such as I. acutiloba, and such large Syrian plants as I. Lortetii and I. Gatesii. The stems are six or eight inches high and the oblong standards and falls are heavily blotched and veined with lilac, purple or chestnut-brown on a grey, yellow or lavender ground. The colouring is so curious that Foster, in 1887, named it I. lupina and it is so variable in colour that in 1896 Freyn described another form as I. Manissadjani.

I. sofarana. Foster, 1899. Named after the locality on Lebanon, Ain Sofar, from which it was obtained by a collector sent by Mr. C. G. van Tubergen, of Haarlem.

This Iris is very similar in size and growth to I. susiana and differs from it only in colour. The ground is creamy-white instead of grey and the veins are dark purple instead of black.

I. susiana. Linnaeus, 1753. This Iris was apparently named after Susa, the ancient capital of Persia, though there is no evidence that it came from that neighbourhood. Its native habitat is in fact unknown though from its appearance we might suppose that it must come either from the Lebanon or from some neighbouring district. The fact that it was sent to Western Europe in 1573 by Busbecq, the Austrian Ambassador at Constantinople, shows how long it has been in cultivation. In these days it is largely grown as a market flower in the south of France and in North Italy.

In good health it is a vigorous plant with broad yellowish-green leaves, twelve or fifteen inches high and an inch broad, of which only the outermost in each tuft are falcate. The stem is ten to fifteen inches high and the flowers larger than those of any species except I. Gatesii. The colour is produced by dark purple-black veins and dots on a grey ground. On the standards the veins are less closely set than on the falls and the effect is therefore somewhat lighter.

XIII.

The Regelia Section.

This small group of five specialized species of Bearded Irises is confined to Russian Turkestan and to the country to the south-east of that region. It was named in honour of Dr. Regel, the botanist, of St. Petersburg who introduced into cultivation so many good plants from Central Asia. In this he was helped by his son, Dr. Albert Regel, who travelled through Turkestan about 1885.

The Regelia Irises are most closely allied to the Oncocyclus species. The seeds of the two sections are indistinguishable and quite unlike those of any other section. Moreover, the rhizomes are very similar with the same bright red skin. Of some species, in particular of stolonifera and Hoogiana, the new growths form at the end of slender stolons often four or six inches long, but the rhizomes of Korolkowi are much more compact and difficult to distinguish from those of the more free growing Oncocyclus species. The real difference lies in the fact that an Oncocyclus Iris never produces more than one flower on each stem, while the stems of the Regelia species bear a terminal head of at least two and often of three flowers.

Another, and a very important, difference between the two sections lies in the fact that the Oncocyclus

species make new and rapid growth in the autumn in spite of every effort to keep them back, while well ripened rhizomes of Regelia Irises, will, if planted at the end of the first week of October, remain so far dormant that the new shoots do not begin to appear above the surface until the New Year.

To those who know them well there is a curiously wellbred and refined appearance about Regelia Irises, which is absent from the commoner Pogoniris. It is difficult to define the difference but one has only to compare a good flower of I. Hoogiana (*see* fig. 19, p. 172), with even the best pallida to appreciate it fully. Unfortunately Hoogiana has hitherto suffered from the fact that its appearances in public have chiefly been made at the Chelsea Show, where the yellow light that enters through the canvas converts the blue tones of the flower when seen in the sunlight into dull purples, but once it becomes known as it grows in the garden, it will be recognized as one of the finest of all Irises.

Iris Hoogiana is remarkable for its uniform colour, whereas the veining of I. Korolkowi is in some of its forms clearer and cleaner than that of any other Iris.

I. Korolkowi has curiously elongated and usually pointed segments closely veined with dark purple or olive-green on a white, cream or purplish ground. Seedlings are easily raised and, as there is endless variety among them, it hardly seems worth while to keep up the four or six names which have been given to varieties in trade catalogues. Concolor is that given to a variety in which the flowers are wholly of a dark reddish-purple but many of the best forms seem to be

still unnamed. The rhizome is very compact and increases rapidly, so that the new growths push up in close tufts, which in favourable seasons flower freely. In all cases the beard is very dark and usually does not extend beyond the end of the styles.

I. stolonifera was named by reference to the remarkable construction of the spreading rhizome. When growth is vigorous in spring, slender stolon or runners push out in all directions and come to the surface four or six inches away from the parent plant. The extremity of each stolon then swells rapidly until it is perhaps nearly an inch in diameter by the time the growth is mature about the tenth of July.

The flowers of this species are a remarkable and beautiful mixture of reddish-purple edged with brown, while there is usually a sheen of light or deep electric-blue spread over the centre of both standards and falls. The beards are prominent both on the blade of the falls and also on the inner side of the standards, so that each flower has really six beards. The colour is usually blue in front, though fading to white or even becoming yellow at the base. In rare cases, it is bright yellow on the blade of the falls and I am inclined to think that the actual colour in any individual plant may vary a little from year to year.

I. darwasica from Bokhara, which has also been in cultivation under the name of Suwarowi, is a slender species with rather colourless flowers, veined with pale purple on a faintly greenish ground. The falls and the standards taper to a long, fine point in a way that is apparently peculiar to this species.

I. falcifolia is a still more slender species from the neighbourhood of Askabad and also from Afghanistan and Beluchistan but, though it appears from herbarium specimens to be very floriferous, and therefore presumably decorative, in its native home, it has apparently never been introduced into cultivation and we do not even know what is the colour of the flowers.

The most recently introduced and by far the most striking and pleasing member of the whole section is I. Hoogiana, a really magnificent Iris. It troubles the florist, perhaps, and the admirer of named varieties, for there is a considerable range of colour among collected specimens. Some are a pale almost sky-blue, others as pale as pallida dalmatica, while others again are of a darker blue-purple. In every case there is a conspicuous beard of closely set orange hairs and the beard is almost as obvious on the inner side of the standards as it is on the blade of the falls. I. Hoogiana has the excellent habit of remaining dormant longer than any of the other species, so that it is less likely to be crippled by late frosts, but, when once it begins to grow about the end of January, it grows faster than the other species and is almost always in flower early in May, before either Korolkowi or stolonifera.

Why is it that these beautiful Irises are so seldom grown? They are no more difficult or more troublesome than Gladioli or Dahlias or any other plant that has to be lifted and stored for some months each year. They have, moreover, the advantage that they have to be lifted and stored in the summer, when storage space is usually more readily available than in winter,

when room has to be found for so many other plants. The only real difficulty is to know exactly when to lift the plants. What we have to aim at is to allow the new growths and the new roots to become thoroughly mature and yet to lift the plants before the latter have begun to branch. The state of the foliage alone is no certain indication of the right time at which to lift, for the leaves usually begin to turn yellow before the rhizomes and roots are really mature. If the rhizomes are lifted at this stage, the roots will wither and perish before planting time comes in October and our object is to preserve them intact until that time, so that as soon as the rhizomes are planted, the roots will send out the fine lateral shoots, which immediately anchor the plants securely in the ground. Experience is the only thing that can teach the exact moment, usually about the 10th or 14th of July in the south of England, when the plants may safely, and should, be lifted. The main point is to wait as long as possible for the roots to mature and yet not long enough to allow them to send out lateral rootlets. My own plan is to dig them up and leave them lying in an open but shaded place for two or three days. Then the foliage can be cut off and the rhizomes stored in open trays or in stout paper bags in a dry place until October. It is well either to fumigate the shed, in which they are stored, with hydrocyanic acid gas at intervals of two or three weeks or else to scatter naphthalene balls freely among the rhizomes. Otherwise they are almost certain to be attacked with myriads of white flies, of which it is by no means easy to rid them.

The soil for these Irises should be well drained, fairly rich in humus and well provided with lime, preferably in the form of old mortar rubble or failing that, of bone meal and superphosphate. In heavy soil the beds should be raised, so that as little rain soaks in as may be. If, in summer, it is possible to arrange lights over the beds, so that they remain quite dry from the end of June until October, the plants will naturally be stronger than if they are lifted and replanted but, on the other hand, it is by no means easy, especially in wet summers so to arrange the beds that water does not soak through to the roots. When this happens, growth will begin again early in the autumn and then the plants are likely to suffer from the effect of severe frost on the young foliage.

Even if the plants are left uncovered, it may well happen that in favourable situations and after a dry, hot summer and autumn they come to no harm in the winter and of course they should be stronger and more floriferous in the following spring than if they had been lifted. Sooner or later, however, Regelia Irises that remain unlifted will be so crippled by the winter weather as not to be worth growing.

Beds for these Irises should be arranged in open sunny positions and, if they can have the protection of a south wall, so much the better. Sun they must have and it is useless to expect them to flourish in cold, sunless situations. In the south of England they all flower in May and the stems grow to a height of 18 to 24 inches.

Seedlings are quite easy to raise, except that the

seeds germinate very irregularly and may lie dormant for several years before they start into growth. They should be sown as soon as ripe in well-drained pots of rich, light soil. The pots should be sunk to the rim in ashes or sand in the open, where they will be fully exposed to frost and snow, which seems to have a most beneficial effect upon them. Early in the new year the almost colourless tips of seedlings will begin to appear and then the pots should be given the protection of a frame or cold house and the young plants should be encouraged to make as rapid growth as possible. When the leaves begin to turn yellow, no more water should be given but the pots and their contents should be thoroughly baked on a sunny shelf or in a dry frame. Then in September the plants may be shaken out and the ungerminated seeds resown. The young seedlings should be planted in the open with the mature plants early in October and should flower in their second season.

Hybrids between Korolkowi and stolonifera are easy to raise and in most cases very beautiful. The colours are very rich and are set off by a deep blue or dark brown beard. I. Hoogiana could probably also be combined with other species but it is so beautiful in itself that it is hard to believe that any hybrid could be preferable to the species.

All the species of the Regelia section have many characters in common. The foliage is slender, of a glaucous green, often flushed with purple at the base. The stem never branches but bears a single head of two or three flowers, and two or three reduced leaves.

The spathes are keeled and wholly green or herbaceous. There is practically no pedicel below the ovary but always a tube of about an inch in length above it.

The various species may be separated as follows :—

	Rhizome comparatively compact.	1.
	Rhizome producing stolons.	3.
1.	Leaves linear, very narrow.	I. falcifolia (p. 172).
	Leaves at least half-an-inch broad.	2.
2.	Falls broad, narrowing suddenly to an oblong haft.	I. Korolkowi (p. 173).
	Falls narrow, tapering gradually to a long point and into the haft.	I. darwasica (p. 171).
3.	Flowers uniform in colour.	I. Hoogiana (p. 172).
	Flowers a mixture of blue and brown-purple.	I. stolonifera (p. 173).

I. darwasica. Regel, 1884. From the district of Darwas in Turkestan.

This species is the first to flower of all the Regelia Irises and the buds usually open about the middle of April. The flowers are rather inconspicuous and remarkable rather for their long pointed segments than for any beauty of colouring. The ground is a pale green or brown, closely veined with brownish red and the beard is of white hairs tipped with blue. It is a slender species with a stem eight to twelve inches long bearing a single head of two or three flowers.

Other forms, which are certainly very closely allied, have been described under the names of Suwarowi and

lineata but it is impossible to find any good botanical characters by which to separate them. Colour alone is surely insufficient.

I. falcifolia. Bunge, 1847. Transcaspia, Afghanistan, Beluchistan.

This small species has apparently never been in cultivation and our knowledge of it is confined to herbarium specimens. The foliage is very slender, the leaves being six to ten inches long by quarter inch broad and the stems are about eight to twelve inches long, bearing a single head of two flowers. The segments of the flower are rather pointed and the colour unknown.

I. Hoogiana. Dykes, 1919. In "Gardeners' Chronicle," 1919, I, p. 277. Another fine Turkestan species, which I was glad to be able to name after the two brothers Hoog, who now constitute the firm of Van Tubergen, in Haarlem. It was due to their enterprise that rhizomes were imported in 1913 from Southern Turkestan, where it was discovered by their collector, Graeber.

I. Hoogiana is perhaps the most aristocratic of all Irises. There is a grace and distinction about the large flowers of uniform colour, set off by the bright golden beard, which is not found even in the best pallidas. The texture is fine and delicate and the outline of the flowers particularly pleasing (*see* fig. 19). The stems may be 18 to 30 inches high and bear a single head of two or three flowers. The colour is

I. Hoogiana.

(Half natural size).

either a very pale grey-blue or some darker shade of blue-purple. A few white forms appeared among the collected plants but they were not vigorous and have almost, if not entirely, died out of cultivation.

I. Korolkowi. Regel, 1873. A native of Russian Turkestan and named after General Korolkow, by whom specimens were first sent to Petrograd.

I. Korolkowi is distinguished from the other Regelia Irises by its compact rhizome, which rarely forms stolons or running growths and by its delicately veined flowers. The segments of the flower are long and pointed and the inconspicuous beard consisting of deep black or greenish-black hairs. The ground colour is usually a creamy white, but may be either light or deep purple and the veins are either olive-green, black or dark purple. The stem is about 15 to 18 inches in height and bears a terminal head of two or three flowers. Local forms vary a good deal both in colour and in the size of the flowers. Some of the best come from Bokhara.

I. stolonifera. Maximowicz, 1880. A native of Bokhara and of other parts of Russian Turkestan.

This fine species was named with reference to its habit of increasing by means of new growths which form at a distance from the original rhizome at the ends of stolons often six or eight inches in length. This is a characteristic which it shares with I. Hoogiana but the latter is easily recognized by its flowers of a uniform colour. Those of I. stolonifera are usually of

a curious shade of light or dark brown-purple, shot especially in the middle of the standards and falls with a light or deep shade of electric-blue. The edges of the segments are frilled and wavy and the beard is either blue or yellow or even of yellow hairs tipped with blue. The actual colour seems to vary in the different forms and even in the same plant from year to year. Like all Regelia Irises, I. stolonifera is often very conspicuously bearded on the inner side of the standards as well as on the falls. There are many varieties of this species differing in the shades of blue and brown in the flowers and in the height of the stem. This varies from 12 to 24 inches but bears only a single head of two or three flowers. There seems, however, to be no good reason for distinguishing more than one species, as has sometimes been done under the names of Leichtlini and vaga.

I. stolonifera has been crossed with I. Korolkowi to produce very richly coloured hybrids of which the conspicuous beards are either dark brown or deep blue. It will also cross with various Pogoniris but the hybrids have always been so ugly that it has not been worth while to keep them. The flowers are usually streaked with confused colours and by no means pleasing.

XIV.

The Pseudoregelia Section.

This small section contains, as far as is known, only four species and corresponds on the south and eastern sides of the Hindu Kush and Himalaya ranges to the Regelias on the north-western slopes.

All the species of the section agree in having curiously mottled flowers, blotched with a deep shade of purple on a lighter ground and oblong rather than rounded standards, extended at an angle of about 45 degrees. The seeds are similar to those of the Regelia section but smaller and with a less conspicuous, circular white attachment. The rhizomes are compact and gnarled in appearance and do not increase rapidly or lend themselves to easy division. The seeds, too, appear to be slow to germinate in this country and, as it is only with great difficulty that rhizomes are obtained, there seems little chance of these Irises becoming common in our gardens. Moreover, it is not easy to cultivate them successfully, for they are used to a climate under which they grow rapidly in the spring and send up their flowers along with the new leaves. Before midsummer the foliage will have obtained its complete development and it will then wither away and the plants will remain dormant until the following spring. In this country the plants are apt either to

rot in our mild, wet winters or else to start prematurely into growth early in the year only to be cut back and crippled by late frosts.

These Irises seem to prefer a rather rich, light soil, which, in spring at any rate, is well supplied with moisture. In summer the plants should be kept dry, once the foliage has withered, and the more they are roasted, the more freely do they flower in the following year.

The four species may be distinguished by the fact that kumaonensis has practically no stem and a comparatively long tube, whereas in all the others the flower stem is several inches in length. Of the three species, which always produce a stem of some length, I. goniocarpa is a slender plant with only one flower on each stem; I. Hookeriana and I. sikkimensis are both stouter plants, whose spathes are two-flowered. In the former the tube is quite short, less than an inch in length, while in the latter it is twice as long.

All the species are of relatively slender growth and are better accommodated in the rock garden than in the open border. In their native homes, I. kumaonensis and I. Hookeriana appear to be very common and to grow in large masses, while I. goniocarpa appears to grow scattered about over the Alpine meadows.

The species of the section may be distinguished as follows :—

Stem very short; perianth tube 2 to 3 inches long.	I. kumaonensis (p. 177).
Stem several inches long.	1.

1.	Plants small and slender; stems bearing a single flower.	I. goniocarpa (p. 178).
	Plants sturdier; stems bearing two flowers.	2.
2.	Perianth tube short; less than 1 inch.	I. Hookeriana (p. 177).
	Perianth tube much longer than the ovary.	I. sikkimensis (p. 178).

I. kumaonensis. Wallich. On the southern slopes of the Himalayas in the Kumaon and Garhwal districts.

This species is stemless at flowering time and flowers when the leaves are only four to six inches long, to which height the flowers are raised by the long perianth tube. The seed capsule develops at the base of the leaves which, when mature, are as much as eighteen inches in length. In this respect the growth resembles very closely that of the Algerian I. unguicularis. The flowers are veined and mottled with a dark shade of purple on a lighter ground. The beard is composed of close-set, rather fine white hairs, more or less distinctly tipped with yellow.

I. Hookeriana. Foster, 1887. Common in Kashmir, extending also into Garhwal and Western Tibet.

This species differs from kumaonensis as I. chamaeris differs from I. pumila, *i.e.* by the lengthening of the stem and by the shortening of the perianth tube, which is not more than one inch long. The flowers are mottled in the same way as those of I. kumaonensis and the two plants flourish under similar conditions.

This seems to be the common Iris of the Kashmir hills and is not difficult to cultivate in this country, especially if the rhizomes are well ripened in summer. In this case the plants remain dormant until a later date in spring and so escape the risk of damage by late spring frosts.

I. goniocarpa. Baker, 1876. Sikkim, the Chumbi valley, Tibet and south-western China.

This species closely resembles I. Hookeriana, from which it differs chiefly by its more slender growth and by the fact that its spathes produce only one flower. The small flower is of a blue-purple shade with deeper blotches, and a beard of close-set, white hairs tipped with orange. An albino form was found by Farrer in Western China.

This species appears to vary a good deal according to the elevation at which it grows and, though Farrer seems to have thought at first that there were more species than one in Western China, yet in the end he confessed that he agreed that the truth was that there were only local forms of this one species. A plant raised from seeds, which he sent home was a compact grower, not more than six or eight inches high and did well for some years in rather rich, light vegetable soil in a sunny garden where it was not allowed to get too dry in the growing season in spring.

I. sikkimensis. Dykes 1912.

The plant, on which the original description of this species is based, was said to come from Sikkim, though

the evidence was not conclusive. When it flowered, it was obviously distinct from the other three species, for it has the stem of I. Hookeriana and a long tube, resembling that of I. kumaonensis. Moreover, when it grew side by side with the other species, it looked very different. Its foliage was much narrower than that of I. Hookeriana and yet did not attain the length or the vigour of that of I. kumaonensis.

XV.

The Pogoniris Section of Bearded Irises.

This section of the genus is on the whole the best known in our gardens but it is by no means the most widely distributed in nature. It seems, indeed, as if the Bearded Irises are a later development from the older beardless Irises and this does not appear so improbable when we remember that under the microscope most Apogons or Beardless Irises appear to have a beard. The "hairs," however, consist in this case of a single cell, quite different in structure from the succession or line of cells, which form the "hairs" of the beard of the Pogoniris.

The theory that the Bearded species are a comparatively late development in the history of the genus is moreover supported by the fact that they are confined to Europe and Asia and do not extend into America or further east than Western China.

The determination of the names of the various species of this section has always been a difficulty owing to the fact that Bearded Irises have been cultivated as garden plants for many centuries. This is due in no small measure to the fact that the rhizomes of these species can easily be carried about in the resting state and are difficult to kill in any country

which enjoys a hot, dry summer, whereas a journey of a few days in hot weather is often fatal to such species as I. sibirica. It is probable for instance, that the variety, which we know as Kharput, was introduced into Kashmir, where it is now naturalized in the neighbourhood of Srinagar, by one or other of the many invaders, who from time to time have made their way into India from Central and Western Asia through the passes of the north-west frontier. The plant was named Kharput by Sir Michael Foster when he received it from the town of that name in Asia Minor. The same variety is also planted on the Guards' Memorial at Sebastopol in the Crimea and it is not unreasonable to suppose that the plants were found growing in that neighbourhood also.

Another curious instance is the presence in Khatmandu, the capital of Nepal, of the variety which is not uncommon in the south of France and which we know as atropurpurea. It was found naturalized in Nepal by Wallich more than a hundred years ago and yet there can be little doubt that it is an importation from the west. It may be asked whether the reverse of this theory may not really be the truth and that the plants reached Asia Minor from the East, but it seems very unlikely that these two plants can be natives of India, partly because they only occur near cultivated areas in the two localities mentioned and partly because they are entirely unlike any of the species which are obviously indigenous.

Iris albicans is probably the greatest traveller of all Irises. Its home is on the mountains of the Yemen

district in the south-east of Arabia and from there it has been carried wherever the Mahomedans have gone. It is common along the North African coast, in Spain, in Sicily and in Asia Minor and it has even been carried across to Mexico from Spain, where it was probably introduced by the Moors. It is always found on or near ground that has once been inhabited and its wide distribution is due to the fact that it is planted in Mahomedan graveyards.

This artificial distribution of many bearded Irises makes it extremely difficult to decide what are the native species of any area that has for centuries been more or less thickly populated. It is only when a knowledge has been obtained of the species, which are undoubtedly wild in mountainous country or in uninhabited areas that it is possible to assert with some conviction that certain plants are not native and that their introduction must have been due to human agency.

A further difficulty is due to the fact that plants do not behave in cultivation as they do in the wild state. They are much more liable to variation even apart from the risks of cross fertilization to which they are subject when they are growing in gardens alongside other species. Thus the so-called I. germanica is not known anywhere as a wild plant nor is it known for certain from what species it arose by hybridisation. It may of course have arisen from some Mediterranean species which has long ago been exterminated as a wild plant and in that case its origin will always remain a puzzle. The only fact that we may claim as certain

seems to be that it is not a native of Germany. It has never been found growing wild in any locality far removed from any inhabited area and moreover it makes new growth in the late summer and autumn and retains these leaves in winter. Yet winters in Germany are very cold and all the species, which are undoubtedly natives of Germany and Austria, such as pumila, aphylla, sibirica, spuria and variegata, lose their leaves in autumn and remain dormant until the spring, as might be expected of plants indigenous in a region where hard frost usually lasts for several weeks each winter.

The common form of the so-called I. germanica that is found in gardens in England is different from those found on the Continent, where indeed there are several different forms. The flowers will often be found to be slightly malformed and the pollen is very scanty, two signs which seem to point to the hybrid origin of the plant. The nearest approach to a wild form seems to be I. Kochii, of which I found specimens growing high up on rocky ground between the two arms of Lake Como, in a position in which it seemed as though it must be wild and not merely an escape from cultivation. Rhizomes from this source have since flowered well in this country but refuse to set seed, possibly because they are all divisions of one plant and sterile to their own pollen.

Another curious puzzle lies in the fact that in the rare cases in which seeds of one or other of the various forms of " germanica " have been obtained and seedlings raised from them, they have always been dwarfer plants than their parent and they usually resemble

I. aphylla. Thus Kurdistan and Srinagar are twin seedlings of Kharput, while Veglia is a self-coloured, light blue-purple seedling of a "germanica" that I found growing on the Adriatic island of that name. It is doubtful whether we shall ever now discover the origin of these various germanicas or be able to decide whether there really is a wild species or not.

Another curious fact about the Bearded Irises is that apparently it is only in this section that hybrids between species occur wild in nature. For instance, there is a shallow valley high up in the Velebit Mountains in Croatia, where small forms of I. pallida and of I. variegata occur and with them hybrids between the two species. The same two species and similar hybrids between them are found near Bozen in the southern Tyrol, where the plants are larger and more vigorous. Moreover it was probably to hybrids coming originally from this latter district that Linnaeus gave the names of sambucina and squalens and it is certainly to their two parents, pallida and variegata, that we owe most of the older garden Bearded Irises, which were long known as "German" Irises.

The cultivation of the Pogoniris Section is extremely easy, provided that the plants are given three things, without which successful cultivation for any length of time is impossible and these three things are sunshine, lime and good drainage. It is true that plants will struggle on for years in shady positions but they will seldom flower or at any rate not flower freely. In a soil that is sour for lack of lime or waterlogged from lack of good drainage the rhizomes will soon rot.

If old mortar rubble is not available, lime is best given in the form of superphosphate and this may be scattered among the plants at the rate of an ounce or two to the square yard and then washed in. Superphosphate of lime has the special advantage that its acid reaction is capable of killing the bacillus which causes the disease known as Pseudomonas iridis or Rhizome Rot, though it is also a fact that Irises growing on a limestone, and therefore non-acid soil, seldom suffer from the disease. For this reason it is always well to add to soil in which Irises are to be grown as much old mortar rubble as can be obtained. It adds the necessary lime and at the same time renders the soil more open and porous and thus ensures good drainage.

There has been from time to time much difference of opinion as to the best period for transplanting Bearded Irises. There is no doubt that Pogoniris are shallow rooting and that they rapidly exhaust the available supplies of nourishment within reach of their roots. Consequently they should be lifted and replanted in fresh soil every third year. In poor soil it may even be advisable to transplant the small species, such as I. pumila, every second year.

Examination of a rhizome of a plant in flower shows that no fresh growth is taking place from the end of the rhizome at the base of the flower stem but that new roots are just pushing out from non-flowering rhizomes and from the young lateral offshoots which are just beginning to develop on either side of the flower stem. The peculiarity of these root fibres is

that they grow to their full length before branching out into rootlets. While they are developing, they grow rapidly and are very tender and brittle. From these facts we may draw two conclusions ; one is that the rhizomes should be in their new positions before the roots send out their rootlets and the other that the main roots must not be damaged. We are therefore faced with two difficulties in transplanting Irises, one being to get the operation finished early enough and the other to avoid damage to the roots while they are young and brittle. If therefore it is only a question of moving an Iris carefully from one part of a garden to another and of replanting it within a few minutes of the time at which it is dug up, then obviously we should proceed to do this as soon as the flowers are over or even when the plant is in flower—a decided advantage when dealing with seedlings or when plants in confusion have to be separated. If care is taken, the young roots will suffer no damage and soon push out into the new, loose soil. They will, however, soon wither if the plants remain long unplanted or are exposed to the sun while out of the ground.

On the other hand, when plants have to remain out of the ground for some days, it is best to wait until August or even September according to the season and the district, for the root fibres will then be mature and much less liable to injury either by rough handling or by exposure to the sun and air. In very dry weather it is as well, when the roots have been arranged and before the soil is thrown over them, to pour water into the hollow. Then shovel the soil back into position

and the loose surface will prevent evaporation and provide the plants with moisture and enable them to establish themselves in their new position.

If, as seems probable, most Bearded Irises form their embryo flower buds for the succeeding year in July, then it is obviously undesirable to move them in that month, for, if they are disturbed then, the chances are that they will receive such a check that they will not flower the next year. Plants which are moved carefully and quickly, while in flower or immediately afterwards and also those that are moved in the latter half of August and September flower freely in the following year, whereas those that are moved in July are often entirely flowerless.

With regard to the choice of soils, there is no doubt that Bearded Irises grow most vigorously in a rather strong, heavy soil but in this country, at any rate, the difficulty is that such soils are apt to be very wet in winter and also to harbour slugs in vast numbers. The rhizomes, therefore, often suffer considerably, especially in winter and, if an Iris garden has to be made on such soil, raised beds or mounds should be thrown up for the Irises in order to secure good drainage. In Southern and Central Europe, where many bearded species are native, the soil is stiff and heavy but there is the long summer drought to ripen the rhizomes thoroughly and, in winter, the ground is either frozen or comparatively dry.

There are unfortunately a few species of Pogoniris, which have proved extremely difficult to cultivate, or at any rate to flower, in this country. The Portuguese

I. subbiflora, will only flower when grown in a warm, sheltered corner among rocks and in a stony soil, where it gets the necessary baking in summer. The Manchurian I. Bloudowii survived in the open in Surrey from 1907 till 1922 but did not once flower. Each spring the curiously bronzed tips of the shoots came up but the growth was never sturdy or vigorous. It was not until the rhizomes were planted in a cold frame devoted to I. Rosenbachiana which remained dry from April till October, except for any moisture that came up through the soil from below, that they consented to flower in 1922 and again in 1923. Similar treatment would doubtless succeed with some of the big species or varieties that are imported from time to time from Syria, Armenia and Kashmir. The difficulty with them is that a frame is hardly large enough and it might be as well to dig up the rhizomes about the end of July or a little later and store them in dry sand in a sunny position until October. Care must be taken, however, to see that the roots have grown to their full length before the rhizomes are lifted and yet they must not have remained so long that they have thrown out lateral rootlets, for in that case the roots would not take hold of the ground when the rhizomes were replanted in autumn.

Bearded Irises have become so popular in the last twenty years that there is a danger that the public and even gardeners may come to think that there are no other Irises. What is still more remarkable is that the innumerable Bearded Irises that are so popular are practically all derived from a comparatively few

species (*see* p. 184). However, if interest in the cultivation of Irises is to be maintained, it is to be hoped that attempts will be made to get into cultivation more of the wild forms and species. There is nearly always some almost indefinable charm about a species which is absent from many of the garden hybrids. The latter tend to be selected from innumerable seedlings according to some artificial standard or to satisfy a craving for size or weird colouring and there is nothing like the variety among them that is to be found among the wild species.

As a rule all the Pogoniris species that flower freely in our gardens also set seeds abundantly, *e.g.* variegata, pumila, chamaeiris, aphylla and to some extent pallida. Seedlings are extremely easy to raise and the majority should flower within two years of the ripening of the seeds. The seeds should be sown about October in pots of rather rich, light soil, containing a fair proportion of either well-decayed leaf mould or very old manure and some lime rubble. The pots should then be sunk to the rim in the open either in a bed of ashes, if the soil is heavy, or in the ground if the soil is sandy and porous. The pots should then be covered with wire netting to keep off birds and leaves and left exposed to frost and snow. In February and March the pots should be frequently examined and, when the points of the young shoots appear, should be given the protection of a frame or cold house. The object of this is not only to protect the young plants from late frosts, which can hoist them out of the soil, but also to induce them to grow as rapidly as possible. With

this assistance they should have produced about five leaves some five or six inches in length before the end of May and should then be planted out about a foot or rather more apart where they are to remain. In good soil and in a sunny position 80 to 90 per cent. of them should flower in the following year. The success of this method can be gauged by the fact that I have known I. pumila to flower in the autumn of the year in which it was planted out while garden hybrids have produced as many as three, four, and actually five flowering stems within two years of the ripening of the seeds.

For purposes of classification and of grouping the various species of Pogoniris, no part of the plant is more important than the spathes or sheathes which enclose the buds. These spathes almost always consist of two valves and, when the flowers expand, may be either wholly green or green more or less flushed with purple. In this case they are called, in botanical language, herbaceous and the opposite condition is similarly described as scarious. This means that spathes have become wholly dry and papery before the flowers open as in the well-known instance of I. pallida. Again, the spathes may be either a mere shapeless wrapping as in I. pumila, rounded with a prominent sharp keel as in the Balkan I. Reichenbachii and I. mellita or much inflated and membranous in texture as in I. imbricata from the south of the Caspian and in I. Albertii from Turkestan.

The following descriptions of the individual species will give the reference to the first description and

naming of each, some account of its geographical distribution and of the characters which distinguish it from its nearest relatives.

For Garden hybrids *see* Chapter XVI, p. 220.

The various species of Pogoniris may be distinguished as follows :—

Group I. Stem not usually branched, bearing only a terminal head of one, two or three flowers. (Occasionally a very strong plant may develop a lateral bud on the stem but this is very rare).

	Stem shorter than the perianth tube.	1.
	Stem at least equal to and usually much longer than the perianth tube.	2.
1.	Spathes membraneous, closely wrapped round the tube, shapeless.	I. pumila (p. 195).
	Spathes green, firm, with a sharp keel.	I. mellita (p. 196).
2.	Leaves and stems arising from close tufts of fibrous remains of leaves.	3.
	Leaves and stems not arising from fibrous remains of former leaves.	4.
3.	Leaves tapering gradually to fine points.	I. tigridia (p. 197).
	Leaves terminating abruptly in a blunt point.	I. Potaninii (p. 198).
4.	Spathes with both valves acutely keeled.	5.
	Spathes with only one valve partially keeled, if at all.	6.

5.	Spathes broad in comparison to their length, green.	I. Reichenbachii (p. 198).
	Spathes narrow, membranous and almost transparent.	I. scariosa (p. 198).
6.	Rhizomes spreading by stolons; seeds with white collar or aril; capsules opening down the sides and not at the apex.	7.
	Rhizomes not spreading by stolons; seeds without white collar or aril; capsules opening first at the apex.	9.
7.	Rhizomes very slender, spathe valves very narrow and membranous.	I. flavissima (p. 199).
	Rhizomes more compact and stouter; spathes herbaceous.	8.
8.	Spathes broad and rounded.	I. Bloudowii (p. 200).
	Spathes long, lanceolate.	I. mandshurica (p. 201).
9.	Perianth-tube not more than twice as as long as the ovary.	I. chamaeiris (p. 201).
	Perianth-tube more than twice as long as the ovary.	10.
10.	Spathe valves membraneous, closely wrapping the tube.	I. pseudopumila (p. 202).
	Spathe valves not membranous, divergent.	11.
11.	Spathe valves wholly green.	I. Griffithii (p. 203).
	Spathe valves green in the lower half but scarious in the upper half.	I. subbiflora (p. 203).

Group II. Stems always branched, bearing one or more buds as well as the terminal head of one, two or three flowers.

	Stems branching near the ground, the flowers on the side branches being raised nearly as high as the terminal flower.	I. aphylla (p. 204).
	Stems branching at or about the centre with comparatively short branches.	1.
1.	Spathe valves wholly scarious before the buds open.	I. pallida (p. 206).
	Spathe valves not wholly scarious before the buds open.	2.
2.	Spathe valves membranous, more or less translucent.	3.
	Spathe valves of stout substance, not translucent.	4.
3.	Spathe valves very broad and much inflated, the outer sharply keeled; falls rounded.	I. imbricata (p. 209).
	Spathe valves narrower and less inflated, rounded, not keeled; falls strap-shaped.	I. Alberti (p. 210).
4.	Spathe valves scarious in the upper third, green below.	I. albicans (p. 211).
	Spathe valves not scarious in the upper third.	5.
5.	Flowers yellow, falls veined with brown-purple.	I. variegata (p. 212).
	Flowers not yellow.	6.

6.	Spathes persistently green; stem with one or two short side branches.	I. kashmiriana (p. 213).
	Spathes green, flushed with purple, becoming scarious at the tip after the first flower has opened.	I. trojana (p. 214).

The above classification is admittedly unsatisfactory. In the first place the separation of those species which have an unbranched stem from those whose stem branches puts far apart such species as scariosa, Alberti and imbricata, which seem to form a natural group. In the second place it ignores such plants as Biliotti, cypriana, mesopotamica, Kochii and junonia, with regard to which the difficulty is that there is no certainty that they grow wild anywhere. Moreover, there is no record of their ever having been raised from seeds, not at any rate in sufficient numbers to prove or disprove their claims to rank as species. They have all come to us from those parts of the world—Asia Minor and Syria—which have been civilised since a very early period and where land has alternately been cultivated and lain waste so many times that it is impossible to say with any certainty whether a plant is indigenous or an importation from elsewhere. If in 1500 B.C. an Egyptian Pharaoh was importing Oncocylus and Bearded Irises from Syria into Egypt, as is shown by a contemporary bas-relief (*see* p. 153), we can hardly be surprised if it is difficult now to say which are really the wild species of Asia Minor and Syria. Who can say whether I. trojana is a native of the Troad or a survival of one of those attempts at gardening in which some members of the hosts of

Achilles may have indulged in order to while away the tedium of a ten years' siege ?

I. pumila. Linnaeus, 1753. Named from the Latin *pumilus*, dwarf, diminutive. Austria, Hungary, Dobrudja, South Russia, the Caucasus and possibly some parts of Asia Minor.

This species has been much confused with I. chamaeiris, from which it is easily distinguished by being almost, if not entirely, stemless and in having a perianth tube two or three inches long. The shapeless spathes which closely wrap the tube distinguish it from the Balkan I. mellita and are usually only one-flowered, though a second flower is sometimes produced (*see* fig. 24, p. 220). I. pumila is extraordinarily floriferous and in some districts, *e.g.* on the Geissberg near Vienna and near Sebenico on the Dalmatian coast, each individual plant has flowers of a different colour, purple, yellow, creamy white or yellow tinged with brown, blue or green. On the other hand specimens from Attica in Greece are almost invariably yellow, while in the Deliblat in Hungary there seem to be a few large forms of some shade of dark purple. The only forms that are often offered in catalogues are varieties called coerulea or azurea which are almost certainly of garden origin and rarely set seed in this country, whereas collected forms seed very readily. *See* also p. 221.

I. pumila is extremely shallow-rooted and should therefore be frequently replanted in good, rich soil. It prefers a good loamy soil and is less vigorous in sand. It may with advantage be lifted and replanted soon after flowering every second year.

The species is peculiar in having a seed capsule in which the walls meet and divide it into three divisions at the top but separate below the centre. This character has not been recorded of any other species. (*See* fig. 20, which depicts the capsule of I. pumila on the stem of I. chamaeiris, the result of hybridizing the two species).

I. mellita. Janka, 1874, from the Latin *mellitus :* delightful. Bulgaria, near Philippolis, Gallipoli and in western Asia Minor.

This species takes the place of I. pumila in the Balkans and closely resembles that species, differing chiefly in the more rigid, keeled, herbaceous spathes which closely resemble the leaves and remain green even after the flowers have faded.

I. mellita is also noticeable for the curiously refined and delicate texture of the flowers. The spathes are more frequently two flowered than in I. pumila and the stem, especially in specimens from western Asia Minor, may be one to three inches long. The colour is usually a characteristic shade of brown-purple, though clear yellow forms are not unknown, especially in Asia Minor. The perianth-tube is two or three inches long.

The variety rubro-marginata from Scutari on the Bosphorus is a small form in which the leaves are edged with a thin line of red, such as may be seen on the lower parts of the leaves of I. Kharput.

I. mellita will flourish under the same conditions as I. pumila.

Capsule and stem of I. pumila x I. chamaeiris,
showing long narrow spathes and withered perianth tube.
(Full size).

I. tigridia. Bunge, 1829. North-eastern Asia from the Altai Range to Manchuria. The meaning of the name is not apparent.

This curious little species grows in dense, close masses with the base of the leaves wrapped in short membranous sheaths and the fibrous remains of old leaves. The stem is only a few inches in length and bears a single head of one or two flowers. The tube is about an inch long in the fully developed flower, of which the colour is either a blue-purple or yellow. The leaves are narrow and less than six inches in length. They taper gradually to a fine point and this readily distinguishes I. tigridia from I. Potanini. From herbarium specimens it is obvious that I. tigridia is a very floriferous little species, well suited to a rock garden, if only plants or seeds could be obtained.

I. Potanini. Maximowicz, 1880. North-western China and Tibet, where it is found at high altitudes up to 18,000 feet. It was named after the Russian traveller, Potanin, who found it in western Kansu in 1886.

This little species would also appear to be a desirable plant for our rock gardens. It is quite dwarf, the stems being only about an inch long and the leaves three or four inches long. The flowers are either purple or yellow, raised to the level of the tips of the leaves by the perianth tube of one-and-an-half inches. The tufts of leaves are encased in the curling fibrous remains of former leaves. The most obvious difference between this plant and I. tigridia is that its leaves are

very blunt with rounded ends and do not taper gradually to a fine point.

I. Reichenbachii. This is the Balkan representative of I. chamaeiris and is as widely distributed in the south-east of Europe as is I. chamaeiris in south-eastern France. The flowers are either a clear yellow of more delicate texture than the flowers of I. chamaeiris or of a brownish purple, like those of I. mellita.

I. Reichenbachii is readily distinguished by the rounded, sharply-keeled spathes, which separate it clearly from I. chamaeiris, with which it is sometimes confused. It seems to grow less readily than that species in this country and needs to be frequently transplanted in well-drained rich soil with plenty of lime rubble.

The stem varies in length from three to nine inches or a foot. The yellow-flowered forms have been introduced into cultivation from time to time under the names of serbica and bosniaca, while that of balkana was given to a brown-purple form and that of athoa to a redder-purple, which came from Mount Athos.

I. scariosa. Willdenow, 1820. From the Caspian Sea east to Turkestan and to the Altai Range.

This rare species, which has occasionally been in cultivation under the name of I. Eulefeldii, is distinguished by its long, membranous and scarious spathes and by its extremely glaucous leaves, to which it owes one of its synonyms—I. glaucescens.

The stem is usually not more than about six inches in length and bears one or two flowers. The spathe valves are over two inches long and the brown-purple perianth tube one-and-an-half inches. The colour is usually red-purple with darker veins on the blade of the falls. The beard is yellow along the haft but becomes white on the blade.

I. flavissima. Pallas, 1773. So called by reason of the colour of its flower, which is a bright vivid yellow.

It is one of those species, like I. ruthenica, which occur in Hungary and then not again until the Altai region in southern Siberia.

This Iris might almost be described as a minute Regelia Iris. Its rhizome spreads by means of slender, creeping stolons, its capsule tapers towards both ends and opens down the side and not at the top, the seeds have the white collar of the Regelia seeds and the spathes bear three flowers, which twist spirally when they wither.

The stems are from two to four inches long and the spathe valves narrow and scarious at the top. The perianth tube is very short. The buds are tinged with brown-purple but the open flowers are bright yellow with an orange beard.

I. flavissima should be grown in sandy soil, well enriched with old leaf mould and not allowed to get too dry in the spring and early summer when growth is rapid. Being shallow rooted, this Iris should be either top-dressed annually or else replanted every second year, in August. The flowers are remarkable

for the cleanness of their colour and are very freely produced. This Iris is also known as I. arenaria.

I. Bloudowii. Bunge, 1833. Named after von Bloudow, at one time President of the St. Petersburg Academy of Science. A native of the Altai Region and of Russian and Chinese Turkestan.

This is a curious Iris, which for many years exercised my patience. Every spring the broad brown shoots of the leaves used to appear and turn green as the foliage grew but no flower-stems appeared. Then after some ten or twelve years the plants had to be shifted and I planted them at the back of a cold frame in which I grow I. Rosenbachiana. The lights are put on this frame in January or February and remain in position till the following October, though the plants get one or two soakings of water in March and April. After that, however, they get none beyond what soaks up through the soil.

I. Bloudowii flowers annually in these conditions, and I am very glad that I persevered with it, for the brilliant yellow flowers are extremely pleasing. The stem is about four or five inches high and bears a single head of two flowers, with a very broad, inflated and keeled spathe. There are a few brownish veins on the haft but the blade of the falls is clear yellow with a golden beard. The oblong standards are of the same yellow colour.

Before they die away in summer, the rather flimsy leaves grow to about ten inches or a foot in length by about half-an-inch in width.

I. mandshurica. Maximowicz, 1880. This is a Manchurian species, which has never apparently been in cultivation. It is intermediate between I. flavissima and I. Bloudowii, having the compact and not stoloniferous rhizome of the latter and the narrow, pointed spathes of the former.

I. chamaeiris. Bertolini, 1837. The name is derived from the Greek χαμαὶ meaning "on the ground" and was given to mark its dwarf habit. South-eastern France and north-western Italy.

This species has been described under many names, the differences consisting merely in variations in height and colour. One instance is perhaps enough to show the value of difference in size. On Mont Majour, near Arles, I once found a plant growing among the bushes near the foot and having a stem some ten inches in length. Higher up the hill in open, rocky ground another plant had a stem of only three inches. The following year both flowered side by side in Surrey with stems six inches long.

I. chamaeiris is very frequently confused with I. pumila and is the species which is most frequently sold under that name. It is readily distinguished from I. pumila by its stem, which is always more than an inch long and frequently more than three inches long, by its greener, more rounded spathes and by its shorter tube, which is never longer than the stem as it always is in I. pumila. It is a very variable plant both in size and colour and is more variable in some localities than in others. On Mont Majour it is yellow, on

Mont Coudon behind Toulon it is yellow frequently shaded with brown, while in other localities further east and south it is more frequently purple. In others, again, many colour varieties are found growing together. In cultivation it gives flowers of every shade of white, yellow, blue-purple and red-purple from the same capsules of seed.

Its foliage is much more persistent in winter than that of I. pumila and for that reason, though I. chamaeiris is quite hardy in the south of England, I. pumila should prove hardier in the north and in countries with a more vigorous winter climate.

I. chamaeiris may be crossed with I. pumila and the hybrids have stems of some length as well as a tube intermediate in length between those of the two parents. It will also cross with I. Korolkowi.

Where its foliage does not suffer in winter, it is a very useful plant for making edgings as it is green throughout the year and flowers abundantly in April. For named varieties, *see* p. 221.

The name of Crimean Iris is sometimes mistakenly applied to this species, possibly because there is a form of it near Hyères, which was described under the name of olbiensis. Olbia, however, was the Latin name of more than one town and was that of Hyères as well as of the better-known Olbia in the Crimea. The dwarf Iris that grows in the Crimea is pumila.

I. pseudopumila. Tineo, 1827.

The " false pumila " is a native of Sicily, where it grows abundantly on the slopes of Mount Etna, and of Apulia in southern Italy.

I. pseudopumila has a stem four to six inches long, bearing usually a single flower, the colour being either purple, yellow or white. The narrow, membranous shapeless spathes closely wrap the perianth tube, which is from two to three inches long.

This species is very closely allied to I. chamaeiris and, if it were not for its distribution, might be looked upon as a hybrid between that species and pumila, for it is practically a large chamaeiris with the long tube of I. pumila. Unfortunately this species is barely hardy in this country and would need a thorough roasting under glass in summer. Consequently it has not been possible to carry out any breeding experiments with it or to ascertain whether it would cross with I. chamaeiris or with I. pumila.

That it is a real species and not a hybrid is proved by the result of crossing I. pumila with I. chamaeiris (*see* fig. 20, p. 196). In this is clearly shown the characteristic capsule of I. pumila, which splits below the apex on top of the stem which we usually associate with I. chamaeiris.

I. Griffithii. Baker, 1892. This was named after Griffith, who discovered it in Afghanistan.

It is very similar to a purple-flowered form of I. chamaeiris. It differs, however, in having a long perianth tube of about two inches and long green spathes. Its rigid spathes differentiate it from I. pseudopumila, in which the spathes are membranous and closely wrap the tube.

I. subbiflora. Brotero, 1804. Portugal, southern Spain

and North Africa. So called because it occasionally produces two flowers instead of the usual single flower. Clusius originally named the plant biflora, not bisflorens as we might have expected, because he found it in flower in November near Coimbra.

This Iris is but little known in this country because it is only after exceptionally hot summers and in favourable springs that the plants will flower in the open. The stem grows to about a foot in height and the colour of the flowers varies a good deal. In the best form that I have seen, which came to me from Coimbra, where Clusius first saw the plant and described it about 1565, the colour was a very dark black-blue, a deeper colour than I remember to have seen in any other Iris. Other specimens are of a rather dull reddish-purple and others again of a yellowish white. In its native home a second crop of flowers is produced in the autumn.

Botanically the plant is distinguished by its rigid, divergent green spathes, which are often as much as three inches in length and by the perianth tube which is nearly two inches long. It comes nearest to I. Griffithii but is distinguished by the fact that its spathes are scarious or membranous in the upper part and often flushed with purple.

I. aphylla. Linneaus, 1753. Southern Germany, Bohemia, Hungary and the Caucasus. This species was well named for it is entirely leafless in winter. Its leaves, however, grow very rapidly so that the

I. aphylla from Hungary.

(Half natural size).

flowers appear early in May and some forms, especially those from Hungary, flower regularly a second time in September and October.

It is characteristic of this species that the stem in strong growing specimens should branch below the centre and frequently indeed at the level of the ground, so that two stems appear to spring from the same point on the rhizome. The spathes are narrow and rounded, entirely herbaceous and either green or flushed with dull purple.

Among wild plants the colour is usually either blue-purple or red-purple with a bluish beard, but white, yellow and pale grey-blue varieties have appeared among seedlings in cultivation.

Owing to the fact that the leaves die entirely away before the winter and do not grow again until March, this species is very hardy and, since it is also very floriferous, it is a most desirable garden plant.

It seems not impossible that I. aphylla may be one of the parents of the so-called I. germanica, for seedlings of the latter have given forms which can only be referred to I. aphylla. The difficulty is that, if this theory is right, the other parent must presumably be a species which keeps its leaves in winter, to account for I. germanica's habit of making new growth in the late autumn and of remaining green throughout the winter. There seems to be no known species which would give the necessary characters when crossed with I. aphylla.

There are many local forms of I. aphylla and they have received between twenty-five and thirty specific

names. In 1914 I had planned an expedition which would have taken me to the homes of most of these local forms but the outbreak of the war made it impossible. Until all these local forms can be grown side by side, it is impossible to classify them, for herbarium specimens are very unsatisfactory. For instance, the typical low-branching stem is not always developed in plants that are struggling for existence in nature, though it is very noticeable when they are well grown in gardens (*see* fig. 21, p. 204).

Another characteristic of this species is found in the wholly herbaceous and somewhat inflated spathes. They are usually green but not infrequently more or less flushed with purple and this purple colour also appears at the base of the leaves. The beard is usually white or white tinged with blue, a colour which is particularly pleasing on some creamy white seedlings.

The plant, which is found in trade lists as I. gracilis, is a dull, yellowish variety of I. aphylla in which the flowers are more or less splashed with pale purple.

The average dimensions of I. aphylla are :—Stem ten to fifteen inches, leaves twelve to eighteen inches when full grown, the outermost in each tuft being shorter and usually falcate or curved ; perianth tube one inch.

I. pallida. Lamarck, 1789. Southern Tyrol, especially in the neighbourhood of Bozen ; so called because its flowers are of a much paler shade of lavender-blue than those of the plants known as I. germanica.

I. pallida.

(Two-thirds natural size).

The characteristics of I. pallida are the tall, stout stem with very short lateral branches, as contrasted with the relative length of those of I. aphylla and I. variegata ; the wholly scarious spathe valves, of a silvery white even before the buds appear ; and the short, perianth tube. The foliage is relatively broad and usually very glaucous.

All these characters are likewise found in the plant described as I. Cengialti, except that it is more slender in all its parts and that the foliage is less distinctly glaucous and the spathes a pale brown instead of silvery.

If we had only the typical Bozen plant and the typical Cengialti from Roveredo, there would be no difficulty in making two species, as indeed I did in the *Genus Iris*. In 1913, however, I spent a month tramping about the coast of Dalmatia and saw in full flower innumerable specimens of what we must, I think, call I. pallida.* At sea level and in good soil the plants have stems three feet in height with a tendency to have the flowers crowded together at the top, and fairly broad foliage in some cases. There is, however, endless variety both in the glaucous or green foliage, in colour of the spathes and in that of the flowers. At higher levels the plants are much dwarfer though the flowers are not much, if at all, reduced in size. I. pallida and I. Cengialti are therefore connected by a whole series of forms, which it seems best to include under the one name of I. pallida.

* The so-called I. pallida dalmatica is almost certainly a garden hybrid of I. pallida. Nothing in the least like it grows wild in Dalmatia.

It would be interesting to conduct experiments on Mendelian lines in order to ascertain the relationship of the glaucous and of the green types of foliage and of the other characters, but in the meantime we seem obliged either to content ourselves with one comprehensive species, I. pallida, distinguished by its short, side branches, short perianth tube and wholly scarious spathes, or to invent dozens of specific names for the innumerable slightly different specimens, which it is easy to find from Trieste to Ragusa.

It is also characteristic of I. pallida to have flowers that are practically uniform in colour. The actual shade is very variable and may be either white or very dark purple or of any intermediate tone.

I. pallida is undoubtedly one of the most important of the species which underlie our garden Bearded Irises. In the alpine valley of Sinokos, some 4,000 feet above Carlopago on the Adriatic coast, I found both I. pallida and I. variegata, and hybrids between the two. The same two species occur together near Bozen with similar hybrids, which were once known as sambucina and squalens.

The flowers of I. pallida are usually strongly scented though there is a good deal of variation among individual seedlings.

Nothing definite appears to be known of the origin of the plant that was described as I. plicata. It is, however, practically an albino pallida, in which a little of the original colour appears in delicate veining round the edge of the standards and falls. In all other respects I. plicata is a typical pallida.

I. pallida is obviously a plant that is prepared to withstand a hard winter, for it loses its leaves in the autumn and the young growths never grow to more than a few inches in length until the spring. The higher mountain forms remain, indeed, entirely dormant until the winter is over.

I. imbricata. Lindley, 1845. A native of the country to the south of the Caucasus and so called on account of its large, overlapping spathes and bractlike leaves on the stem.

This species is distinguished by its broad, inflated, green spathes, of somewhat membranous substance. The branching stem is some twenty inches in height and the foliage is broad and approximately equal in length to the stem. The earliest and outer leaves of each tuft are usually very blunt and rounded, so much so that specimens of the species were re-named at Kew I. obtusifolia.

The colour of the flowers is usually a pale greenish yellow, though at least one purple flowered seedling has appeared in cultivation. When the flowers of the yellow form are clear in colour, they are quite pleasing, but for some reason which is not clearly understood, they are sometimes splashed with purple, which gives them a muddy appearance. This may be due to the effect of cold and late frosts on an early flowering species. The beard of the yellow form is composed of white hairs tipped with yellow and that of the purple form of dark bluish hairs.

I. imbricata seeds readily in this country and is

easily raised from seeds. It must not be confused with the so-called I. flavescens, which is a hybrid of garden origin, probably of I. variegata and certainly not of I. imbricata.

I. Alberti. Regel, 1877. A species from Russian Turkestan, named by Dr. E. Regel after his son Albert, who discovered it in the valley of the river Almatinka.

This is a very distinct species, the flowers of which are noticeable for the way in which the thick brown veining on the haft stops abruptly at a line across the breadth of the falls about on a level with the end of the beard. The veins do not gradually fade away into the uniform colour of the blade but suddenly come to an end. This character is transmitted to seedlings raised by crossing I. Alberti with other species. I. Alberti wants a warm, dry soil to do well and is then valuable for its early flowering habit, for it is often the first of the tall bearded Irises to bloom about the end of April. The typical plant has flowers of a rather light lavender-purple but yellow-flowered forms are also known and in these the veins are brownish-yellow. The beard is of pale bluish hairs tipped with yellow.

The blade of the falls is strap-shaped and not rounded as in I. imbricata, to which I. Alberti seems to be related by reason of its membranous, herbaceous spathes. Those of Alberti, however, are rounded, whereas the outer valve of the spathes of I. imbricata is sharply keeled. The seed capsules of both species are rounded with very thick walls.

I. albicans. Lange, 1860. The name was given because Lange only knew the white form, which he found growing at Almeria in Spain. There seems, however, to be little doubt that there is also a blue-purple form, which is known in commerce as I. Madonna.

It has long been the experience of Foster and of others, to whom Irises have been sent from the Near East, that the white I. albicans is often included among them. About 1895 the firm of Dammann, of Naples, received from the Yemen district of Arabia a blue-flowered Iris, which was sent out under the name of Madonna. When this grew in my garden, I was struck by the similarity of the plants to those of I. albicans. The central leaves of each tuft are twisted spirally, the leaves persist through the winter and their tips are always browned by the frost, the spathes are short, broad and scarious only in the upper third and the side branch is very short. The flowers have curiously smooth standards and oblong, bluntly pointed falls.

I came to the conclusion that albicans and Madonna were only colour forms of one species and this conclusion was subsequently confirmed when I found in the Paris herbarium specimens of both forms collected by Botta, in 1837, in the Yemen and a letter from Sprenger among Foster's notes to the effect that I. Madonna had been imported from the Yemen and that there were white forms mixed with it.

It was then obvious that I. albicans had spread from Arabia to wherever the Mahomedans had penetrated, for it was planted on their graves and its curious

distribution all round the Mediterranean and into Asia Minor and Spain was at once explained.

I. albicans is a fine garden plant. The flowers are of more solid substance than other, early-flowering, white Irises and have a cleaner outline. The beard is of white hairs tipped with yellow, which become wholly yellow far back on the haft. There are no hairs on the haft of the standards, as there often are in the case of florentina and other white forms of germanica.

I. albicans has nothing whatever to do with florentina, the albino of a slender germanica, which is one of the plants grown near Florence along with forms of pallida for the production of Orris Root.

Unfortunately neither albicans nor its variety Madonna will set seed at all readily in this country. It would be extremely interesting to self-fertilise both and also to raise seedlings by crossing them together.

I. variegata. Linnaeus, 1753. This species with its yellow standards and with its yellow falls variegated with chestnut or purple is so distinct that it has no synonyms. Its habitat extends south and east from the neighbourhood of Vienna to Croatia, Servia, Bulgaria and Dobrudscha.

Its foliage is rather thin, narrow and conspicuously ribbed. The stem is from one to two feet long and usually bears two or three lateral heads of flowers. The spathes are somewhat inflated and wholly herbaceous, either light green or flushed with purple and this purple colouration is also found at the base of the

I. variegata.

(Slightly reduced).

leaves. The amount of purple or chestnut veining on the falls varies considerably in different specimens and the circumference is sometimes pale yellow and sometimes wholly purple when the veins have coalesced and run together.

I. variegata is extremely hardy, for its leaves die entirely away in the autumn and the plants remain dormant until the spring. It also seeds abundantly and is undoubtedly the source from which have been obtained the yellow tones in the majority of our Garden Bearded Irises. The dimensions of wild specimens of I. variegata vary in the same way as those of I. pallida, for there are large, tall lowland forms and alpine forms not more than a foot high. In rare cases the yellow ground has been replaced by white (cf. *I. lepida*, Heuffel, 1853; *I. leucographa*, Kerner, 1863), and it has been found possible to change the white to blue by hybridisation. Thus the well-known variety Black Prince is a variegata, as can be proved by self-fertilisating it and raising seedlings. Some wild forms of I. variegata flower early in May while others are several weeks later and among the latest of the Bearded Irises.

I. kashmiriana, Baker, 1877. A Kashmir species, which is also found in Afghanistan and Baluchistan.

This is a tall Bearded Iris, distinguished by its long, green spathes, of which the valves are often three or four inches long. The yellowish-green leaves are ribbed and about twenty inches long and the stout, oval stem is a little taller.

The colour of the commonest form is a creamy white with a beard of white hairs, tipped with yellow along the haft. Other forms are of a lavender or blue-purple. All have a characteristic and strong fragrance.

It is a difficult species to keep in good health in this country, probably because the rhizomes do not get the necessary roasting in summer.

I have never been able to separate from I. Kashmiriana the plant which is known as I. Bartoni and which Foster received from Col. Barton who found it in Kandahar. It is a rather dwarf variety and comes botanically between I. Griffithii and I. Kashmiriana.

I. trojana. Kerner, 1887. This Iris was sent to Vienna by Sintenis from the Troad but its distribution as a wild plant is unknown.

Its sturdy growth, branching habit and large flowers commended it at once to hybridists and it was with this species that the firm of Vilmorin worked, when it produced several good hybrids, including Alcazar, early in the nineteenth century (*see* also p. 233). The foliage is rather narrow for so large a plant and the stem which is about three feet high branches low down and in vigorous specimens has secondary heads of flowers on these branches, so that five or six large flowers may be open at the same time.

The spathes are narrow, taper gradually at either end and are flushed with red-purple. They become scarious in the upper part when the first flowers have opened. The flowers are large with rounded standards of a light blue shade of purple, while the long falls are

somewhat redder in tone. The beard is of white hairs tipped with yellow on the blade of the falls but becomes wholly yellow on the haft.

I. trojana was originally introduced into our gardens under the name of asiatica and has often been confused with and grown for I. cypriana.

Certain Tall Bearded Irises.

Under this heading it seems advisable to group and to attempt to describe and distinguish a number of Irises, which may or may not have an equally good claim to specific rank as those already described. It has already been explained on page 194 that they are nowhere known to be certainly wild but, as the names are in frequent use among gardeners, it seems best to give particulars which it is hoped will enable each one to be recognized.

I. germanica. Linnaeus, 1753.

This is no individual variety but an abstraction from a group of varieties which agree in the following characters :—Leaves of some length in winter ; flower stems liable to destruction by frost before they have emerged from the leaves ; stems bearing a terminal head of two flowers, a lateral branch three or four inches long and between them another short-stemmed head or two ; spathes scarious in the upper half, green, more or less flushed with purple at the base ; capsules narrow, oblong, triangular in section ; seeds very few,

oval, not flattened ; standards usually a little paler in colour than the falls and often bearing a few, straggling hairs on the haft.

The nearest approach to a wild form seems to be *I. Kochii*, Kerner (1887), a rather dwarf plant not growing to a height of much more than two feet with rich red-purple flowers of particularly smooth outline, not unlike that of albicans, and without any white ground showing between the thick brownish veins at the end of the haft (*see* p. 183).

Seedlings of I. germanica are difficult to obtain and are usually dwarf, with some of the characteristics of I. aphylla. It might be supposed that all the varieties of I. germanica arose by the hybridisation of I. aphylla, but the other parent is unknown. It would probably have to possess spathes which were, at any rate, partly scarious and the habit of making new growth in the autumn which would persist through the winter.

In milder climates than ours, such as that of California, I. germanica is capable of almost continuous growth and perpetual flowering, for blooms appear at odd times almost throughout the year.

There are several white forms of I. germanica, of which the best known is florentina, which betrays its origin in the bluish tinge of the flowers and in the occasional occurrence of purple splashes on the standards or falls. I have even seen a standard which was half white and half purple. Other white forms are germanica alba with broader falls and a yellow beard and Istria with greenish veins on the haft and a white beard.

I. Biliotti. Foster, 1887. Named after Alfred Biliotti, a British Consul at Trebizond on the Black Sea, from whom Foster received plants in 1884.

This is practically a germanica with long, narrow green spathes, not scarious. The falls are red-purple with brownish veins on white on the haft and the standards are of a bluer shade. The style crests are of an opal colour. The leaves are of a peculiar shape, being narrow at the base and having their widest point above the middle.

I. junonia. Schott and Kotschy, 1854. It is not known why the plant was so named.

It is doubtful whether the true plant is now in cultivation. It was found originally on the Cicilian Taurus in Asia Minor and was once sent from there by Siehe of Mersina to Haage and Schmidt of Erfurt. One of these plants once flowered in my garden and corresponded exactly with the original description. Confusion has arisen because on other occasions Siehe sent out other plants under the same name.

I. junonia has very short and narrow foliage, only about a foot or fifteen inches in length, whereas the stem is at least two feet high. This bears numerous lateral branches and heads of lavender-blue flowers. The standards are lavender and the falls bluer with a beard of white hairs tipped with orange. The spathes are between one and two inches, green below and scarious above.

As might be expected of a plant from the Cicilian Taurus, I. junonia loses its leaves in autumn and remains dormant through the winter.

I. cypriana, Baker and Foster, 1888, and *I. mesopotamica*, Dykes, 1913, are two plants, which are imperfectly known and which have been much confused. They may both be distinguished from I. junonia by the fact that their foliage begins to grow again in the autumn, so that the leaves are of some length in winter and consequently liable to damage by frost.

I. cypriana has narrow foliage compared with that of mesopotamica; its spathes are very broad and rounded and the outer valve is almost wholly scarious, while those of mesopotamica are longer and narrower, green in the lower half and scarious above. The perianth tube of cypriana is longer and more slender than that of mesopotamica.

The flowers of I. mesopotamica are of a lavender-blue shade not unlike those of I. junonia, while those of I. cypriana are very large with a prominent white beard, of a distinctly red shade of purple and wedge-shaped with their greatest width near the extremity.

I. cypriana reached Foster from Cyprus and I. mesopotamica was sent home from Mardin in Armenia. I. Ricardi appears to be a form of mesopotamica and came apparently from Syria. (*see*, in this connection, p. 194). The stems are so long and the flowers so big and heavy that the stems often sprawl instead of standing erect and this detracts from their usefulness in the garden.

All these tall Bearded Irises from Asia Minor and Syria must have a more thorough ripening of their rhizomes in summer than they usually obtain in this

country. Possibly they would succeed if the rhizomes were either covered with glass during July, August and September or dug up at the end of July, stored in dry sand in a sunny shed until October and then replanted.

XVI.

Garden Bearded Irises.

There is always something ephemeral about a garden hybrid as opposed to a wild species. What is best to-day is often surpassed to-morrow and it is rare to find two people who will entirely agree as to what is really best. Further, there seems to be no doubt that French and American raisers and growers have a preference for what we called shot, smoky or clouded colours, while in England we most of us seem to prefer pure colours and uniform shades. American growers seem inclined to lay too much stress on height of stem and size of flower and to forget that some smaller varieties are wanted for the front of our borders.

The best advice that can be given to any one who wants to start growing garden Irises is that he should go and see a large collection, pick out the varieties that please him most and then be prepared to defend his choice. An alternative is that he should raise seedlings for himself. All his geese will then be swans and the number that he keeps need only be limited by the space at his disposal.

The earliest Bearded Irises to flower are also the smallest, namely I. pumila and I. chamaeiris. Of the former there are endless varieties in nature but practically no named forms. Even the well-known " pumila

I. pumila and outline of perianth tube and ovary.

(Full size).

coerulea " is not really a pumila but probably a hybrid between that species and I. chamaeiris. In fact there are two quite distinct plants in commerce, one of which is practically a pumila while the other is a chamaeiris. The real pumila coerulea has flowers of a pale sky-blue and opens its first flowers usually in the first week in April. The other plant, which is often offered under the name of pumila azurea, has a tinge of grey overlying the blue and the short tube and obvious stem of chamaeiris. These dwarf plants are comparatively shallow-rooting and for that reason need to be transplanted every second year, if not every year. Otherwise they seem to exhaust the soil within reach of their roots and then become less vigorous and dwindle away.

I. chamaeiris sets seed readily and seedlings are very easy to raise. Some gardeners prefer to do this for themselves and to select those seedlings which please them most. Those, however, who have not the patience to raise seedlings for themselves will find that of the named varieties some of the best are formosa, a violet-purple which is sweet-scented ; cyanea, a deep violet-blue ; florida, a pale citron-yellow, and Orange Queen, a good clear yellow. Marocain, introduced by MM.Millet et Fils, in 1914, is becoming popular by reason of its splendid colour, a deep blackish-violet, even deeper than Souvenir de Mme. Gaudichau. Both pumila and chamaeiris should be in flower in April and deserve a place in every rock garden, though care must be taken later in the season to prevent rampant carpeting plants from growing over and smothering them.

The stronger-growing varieties of chamaeiris are slso admirably adapted for forming an edge to an herbaceous border—an edge, moreover, which is practically evergreen. Pumila and chamaeiris are closely followed by I. aphylla in its many forms. Of this the wild plants have flowers of red-purple, usually of a dark shade, though white, yellow and pearly-grey seedlings have appeared. One of a pale yellow splashed and mottled with purple has long been known most inappropriately as I. gracilis. A deep blue variety, "Blue Boy," we owe to Foster and two floriferous little seedlings, which appeared in my garden, have recently been put into commerce. Pyramus is a violet-purple self and Thisbe a pale bluish-white. The height is about nine inches or a foot and in all cases the beard is tinged with blue.

At the end of April and early in May we have in flower the so-called Intermediate Irises, many of which, are supposed to have been raised by crossing the later varieties with the small species already mentioned. Several of them were raised by Caparne in the Channel Islands, where the warmer spring climate probably makes it easier to obtain seeds of some early varieties than it is on the mainland. The best of his varieties are possibly Queen Flavia (20ins.), a clear yellow; Prince Victor (18ins.), light and dark blue-purple; Ivorine (18ins.), creamy white, and Royal (18ins.), a particularly good grower with clear blue standards and reddish-purple falls.

Within the last few years some growers have attempted to enlarge the Intermediate section by

including in it such early flowering varieties as florentina, Siwas, Kochii and Kharput. The term intermediate was probably first used in this connection by Caparne and he certainly understood by it dwarfer varieties than these. He defined it, in fact, as meaning an Iris of the size and growth of a large chamaeiris but with flowers the size of atropurpurea or Kharput. Since Caparne's time, moreover, quite a number of varieties have appeared, which may quite properly be classed as Intermediate. Bosniamac (24ins.) with sulphur-white standards and creamy falls faintly overlaid with pale lavender was raised by Miss Willmott by crossing a yellow form of I. Reichenbachii, known as bosniaca, with "germanica" macrantha. This hybrid is not unlike M. Denis' hybrid Ricardi × serbica (another name for bosniaca), which has lately appeared in commerce under the name of Perdita (20ins.). Some of these early flowering varieties are of most unexpected origin. For instance the rich red-purple Kurdistan (15ins.) is a seedling of Kharput as is also Srinagar (15ins.) with standards of clear aniline-blue and remarkably long falls of rich dark blue-purple. Zwanenburg (22ins., Denis) is a hybrid of susiana and of a large yellow chamaeiris, "lutescens," and has a grey ground overlaid with old gold and bronze.

A little later than these Intermediates comes the group which was formerly known as germanica, containing such good varieties as Kochii, which is possibly a wild plant from the neighbourhood of the Italian lakes and which is distinguished from the very similar variety atropurpurea, or nepalensis, by its more oval

and less wedge-shaped fall and by the brown and not white ground that appears between the coarse veins at the side of the haft of the falls. Macrantha or Amas (28ins.) has flowers of fine substance but probably wants a heavy soil, if it is to do well. Siwas (28ins.), a collected variety from Asia Minor, has pale blue standards and darker blue falls and Yellow Hammer (20ins.) which was obtained by M. Denis as a seedling of the so-called lutescens, is the best yellow to associate with it. Florentina (28ins.) is a bluish-white form of a slender purple variety which is grown near Florence, for Orris Root and germanica alba is a white counterpart of atropurpurea. Istria (30ins.) is another fine white variety with a white beard, which I found growing by the roadside between Fiume and Abbazia. Cretan (36ins.), another collected variety, is tall, sturdy and remarkably free flowering. The standards are a bright violet-blue and the falls a rich shade of violet-purple.

Early in the season the only yellow species, taller than a chamaeiris, are the Caucasian I. imbricata (28ins.) with which the garden seedling flavescens was confused and a yellow variety of the Turkestan I. Alberti. Alberti (30ins.) itself has been combined with pallida and the result is a series of tall growing varieties resembling pallida but flowering in the first week in May. Three of these have recently been introduced under the names of Charmian (39ins.), Cymbeline (45ins.), and Octavia (39ins.).

By the end of May the number of varieties in flower is so great that it is difficult to know how to classify them. It might be possible to group the varieties

historically or under the names of their raisers, for each raiser seems in a way to have a different ideal and selects from among his seedlings in a different way.

In the following lists the height of each variety is given in inches together with the name of its raiser and the date of its introduction into commerce. The difficulty of giving accurate and satisfactory colour descriptions is very great. Some have tried to standardise their descriptions by using either the Répertoire de Couleurs of the French Chrysanthemum Society or Ridgway's Colour Chart, but, unless these publications are constantly at hand when the descriptions are read and until we all become more familiar with their colour names than we are at present, the results are often not a little puzzling. To Ridgway "royal purple" is deep blue and "true purple" a bright red shade, while his violet is a blue shade and that of the Repertoire a pale red-lilac. Another difficulty is that there are at least two distinct ways of looking at an Iris. It may be considered either as a whole, as it grows in the garden and looked upon from a distance of a yard or two, or else its standards and falls may be taken separately and laid alongside the colour chart. In the latter case it will almost always be found that each example is a mixture of several colours while in the former the impression conveyed by the sunlit flower in the open garden is quite different from the effect we get when we see it under canvas at a show or even in a room. The yellow light under canvas is particularly damaging to the colour of Irises and no Iris has probably suffered more for this reason

that I. Hoogiana. The magnificent clear, light lavender of the flowers seen in the open becomes a dull pinkish-purple under canvas and the flowers are hardly recognizable as the same. It is therefore with full knowledge that the result is far from satisfactory that I attempt to give some description of the colouring of each variety.

I am fully aware that the number of varieties mentioned in this chapter is very large and that few amateurs will want to grow so many. On the other hand, it is equally true that each variety mentioned has some special merit which makes it difficult to exclude it from any good collection. The number of varieties offered in trade catalogues now runs into several hundreds and I have merely endeavoured to help the beginner by selecting from among them about fifty standard varieties. To these I have added about twenty of what appear to be the best among the latest introductions. These lists are my personal selection and I do not flatter myself that they will be accepted without criticism.

Of the older varieties those most likely to survive are Black Prince (30ins., Perry, 1900) with very deep, velvety falls and a very late flowerer ; Caprice (20ins., Vilmorin, 1904) with standards of a reddish-mauve and falls of a deep rosy-red ; Caterina (48ins., Foster, 1909), pale lavender, flowers large but a weak stem, often unable to hold itself erect ; Edouard Michel (30ins., Verdier, 1904) of a unique shade of what might almost be called wine-red ; Gracchus (24ins., Ware, 1884), a bright and very free flowering variegata ; Her

Majesty (32ins., Perry, 1903), of a slightly deeper shade of lilac-pink than Queen of May and with more veining ; Innocenza (24ins., Lemon, 1854), a late, pure white ; Isoline (36ins., Vilmorin, 1904) with lilac-pink standards and deeper falls, has the reputation of being a shy flowerer and needs a warm position to do well ; Jacquiniana (30ins., Lemon, 1840), with coppery-crimson standards and velvety maroon falls ; Madame Blanche Pion (30ins, Cayeux, 1906), not unlike Nuée d'Orage but brighter ; st. soft bronze-yellow f. rich purple. Ma Mie (30ins., Cayeux, 1906), an improved Mme. Chéreau (32ins., Lemon, 1844), with large flowers veined at the edge with blue on a white ground ; Maori King (20ins., Ware, 1890), a very brightly and richly coloured dwarf variegata ; Mrs. Alan Gray (26ins., Foster, 1909), with rather small flowers of soft lilac-pink and the habit of flowering a second time in the early autumn ; Mrs. Horace Darwin (24ins., Foster, 1873), a white seedling raised by Foster, which has inconspicuous violet veining on the haft of the falls ; Mrs. Neubronner (24ins., Ware, before 1900), with flowers of a rich golden-yellow ; Oriflamme (30ins., Vilmorin, 1904), with immense flowers, light and dark blue ; Queen of May (36ins., introduced before 1859), soft lilac-pink ; pallida dalmatica (36ins.), a very old garden hybrid of fine form and of a beautiful pale lavender shade.

More recently than the above varieties the following seem to have established themselves firmly in public favour :—Afterglow (36ins., Sturtevant, 1918), st. and f. soft greyish-lavender shading to buff and to yellow

at the haft; Alcazar (48ins., Vilmorin, 1910), st. aniline-blue, f. deep velvety violet-purple; Ambassadeur (46ins., Vilmorin, 1920), st. clouded, reddish-violet, f. velvety, dark reddish-violet with orange beard; Asia (48ins., Yeld, 1916), st. pale lavender suffused with yellow at the base, f. pale reddish-purple; Balaruc (30ins., Denis, 1920), a pure white seedling of Mrs. H. Darwin and of great substance, raised by M. Denis; Ballerine (48ins., Vilmorin, 1920), st. pale lavender-blue with wavy edge, f. a slightly darker shade of the same colour; B. Y. Morrison (33ins., Sturtevant, 1918), st. pale lavender, f. deep purple with a wide lavender border; Dalila (30ins., Denis, 1914), st. white, f. rich red-plum colour; Dominion (30ins., Bliss, 1917), an improved Black Prince with dark, velvety falls of great substance; Eldorado (32ins., Vilmorin, 1910), st. yellow-bronze shaded with heliotrope, f. bright violet-purple; Fro (30ins., Goos u. Koenemann, 1910), one of the best variegatas, st. bright yellow, f. brown-crimson with a yellow edge; Glitter (27ins., Bliss, 1919), another good variegata, earlier than Fro; Goldcrest (30ins., Dykes, 1914), a self-coloured flower of a bright violet-blue with a conspicuous golden beard; Iris King (36ins., Goos u. Koenemann, 1907), st. old gold, f. crimson-maroon edged with gold; Jeanne d'Arc (30ins., Verdier, 1907), with white flowers, faintly veined with pale blue round the edges of the petals; Lady Foster (40ins., Foster, 1913), with very large flowers of pale blue, the falls being slightly deeper in colour than the standards; Lent A. Williamson (40ins., Williamson,

1918), an American improvement on Alcazar, very richly coloured; Lord of June (40ins., Yeld, 1911), st. pale lavender-blue, f. deep aniline-blue—one of the best of Mr. Yeld's seedlings, with numerous flowers of large size on well-branched stems; Lorely (30ins., Goos u. Koenemann, 1909), st. clear yellow, f. a velvety, reddish-brown edged with yellow—a very popular and distinct variety; Mademoiselle Schwartz (48ins., Denis, 1916)—one of the tallest of all Irises with large flowers of the palest mauve, paler even than pallida dalmatica; Magnifica (38ins., Vilmorin, 1920), with large flowers on a well-branched stem, st. lavender-blue, f. dark reddish-violet with a golden beard; Medrano (26ins., Vilmorin, 1920), a late flowering variety of very remarkable colouring, st. a dark copper-red, f. even darker, reddish-violet; Opera (30ins., Vilmorin, 1916), st. rich pansy-violet with some bronze shading at the base, f. deep violet-purple; Prosper Laugier (36ins., Verdier, 1914), an improved and more richly coloured Jacquiniana; Prospero (45ins., Yeld, 1920), a vigorous strong-growing variety with pale lavender standards and deep red-purple falls which fade to a lighter shade at the edge; Quaker Lady (27ins., Farr, 1909), with somewhat small flowers of a curious combination of lavender and yellow; Queen Caterina (36ins., Sturtevant, 1918), large rosy-lavender flowers on stout stems; Rheinnixe (32ins., Goos u. Koenemann, 1910), st. white, f. violet-purple, edged with white; Richard II (20ins., Dykes, 1914), a son of the Black Prince, st. white, f. deep violet with a conspicuous white edge; Seminole (39ins., Farr, 1920), one of the

" reddest " varieties, the falls a little darker than the standards ; Shekinah (36ins., Sturtevant, 1918), a tall, pale yellow variety raised in America ; Troost (26ins., Denis, 1908), st. deep rosy-purple, f. a little paler but with deeper veining ; White Queen (24ins.), a plant of uncertain origin, which was formerly known as Queen Mary. The flowers are small but pure white and very freely produced.

Of the most recently introduced varieties the most notable are :—Anne Page (40ins., Hort, 1919), a pale lavender-blue self ; Aphrodite (48ins., Dykes, 1922), a bright violet-pink self without any obvious veins ; Bolingbroke (30ins., Hort, 1922—as Blanche), a fine white seedling of Miss Willmott ; Bruno (33ins., Bliss, 1922), a variety of the substance of Dominion but different in colour, s. light bronze, f. of velvety, deep red-purple ; Cardinal (36ins., Bliss, 1922), a Dominion seedling with lavender standards overlaid with rose and with fine, glossy, dark purple falls ; Chasseur (36ins., Vilmorin, 1923), a distinct yellow variety, the colour being deeper near the edge of the falls than in the centre ; Citronella (33ins., Bliss, 1922), st. pale yellow, f. reddish-brown with a yellow streak continued beyond the end of the beard which somewhat spoils the effect ; Duke of Bedford (36ins., Bliss, 1921), a deep, rich violet of very velvety texture ; Harmony (38ins., Dykes, 1923). It is a pity that this variety could not keep its first name of Thundercloud. It is self-coloured, of a rich, deep purple-blue with a dark beard ; Leonato (48ins., Hort, 1922), st. pale lavender, f. slightly darker lavender-blue ; Paladin (34ins., Bliss,

1921), a macrantha seedling which is an improvement on Oriflamme with clear violet-blue standards and dark violet-purple falls ; Peau Rouge (28ins., Cayeux, 1923), a very richly coloured variety, s. coppery-red, f. deep red with a brown tipped yellow beard ; Ruby (36ins., Dykes, 1922), a deep, reddish-violet with a blue beard tipped with gold, flowers of medium size but of splendid colour when the light shines through them ; Sapphire (30ins., Dykes, 1922), one of the best blue Irises with a brilliant yellow beard and very free flowering ; Souvenir de Mme. Gaudichau (40ins., Millet, 1914), a very deep, velvety violet-blue ; Sunset (*ochracea coerulea*) (30ins., Denis, 1919), a very late flowerer, st. old gold, f. coppery-yellow suffused with violet ; Tenebrae (36ins., Bliss, 1922), another free-flowering Dominion seedling of dark, dusky colouring ; Titan (36ins., Bliss, 1921), st. light violet-blue, f. deep violet-blue ; Virginia Moore (30ins., Shull, 1921), a yellow American seedling which is better than Shekinah ; Wedgewood (40ins., Dykes, 1923), a late flowering, self-coloured variety of a rich blue colour, set off by a pure white beard ; Yeoman (33ins., Bliss, 1922), a free-flowering Dominion seedling with standards and falls of light and dark blue-violet.

It is difficult to conclude this chapter without adding an appreciation of the work of some of the various raisers, who have given us new varieties in the last twenty years.

In this country little had been done before 1900 to raise garden hybrids on a large scale. Foster had made a few experiments with new introductions and obtained

such good hybrids as Caterina and Miss Willmott but they were produced rather as the result of other enquiries and not as an end in themselves. Yeld, of York, on the other hand, aimed at tall stems and good flowers and by rigorous selection produced such good things as Asia, Prospero and Lord of June. Then Bliss produced Dominion, which in favourable circumstances is very fine but which does not do well everywhere. It was the herald of a new race with flowers of great substance and velvety falls, containing such fine varieties as Swazi, Duke of Bedford and Bruno, Titan, Moa and Bertrand. These are still rare and it remains to be seen whether they will flower freely under ordinary garden conditions. Sir Arthur Hort has been remarkably successful in raising large-flowered varieties of pale and dark shades of blue-purple, but for some reason they do not seem to do as well in the open conditions of the nursery gardens as they used to do in his walled garden at Harrow. Perhaps it is that they need the heavy soil they had there. My own contributions have been partly the results of experimental pollination, such as Kurdistan and Srinagar, two seedlings which came of an attempt to discover the origin of Kharput by self-fertilizing it with its own pollen or the new race of early-flowering, tall pallidas, which derive their precocity from the Turkestan species—I. Albertii. Among garden hybrids my inclination lies towards self-coloured flowers, of which Goldcrest, Sapphire, Ruby and Aphrodite are good examples. The last named, the pinkest of them all, suddenly appeared rising above a bed of pallida

seedlings of which the vast majority were distinctly blue in tone.

Another pink or light rose variety is Mrs. Marion Cran, which was raised by Mr. Amos Perry, of Enfield. This grower, the son of the raiser of Black Prince and Her Majesty, has lately put on the market a very large number of varieties of his own raising and some of them are certainly destined to stand the test of comparison with those of other raisers. One of the best has been named Lord Lambourne. It grows to about forty inches. The standards are of bronze and fawn and the falls a rich madder-crimson.

The French taste seems to differ entirely from ours and from the American, as was quite obvious when English and American growers went over to the Iris Conference in Paris, in 1922. Such varieties as Nuée d'Orage and Loute have never become popular here and M. Denis' interesting Demi-deuil seems no longer to be even offered in catalogues. Many of M. Denis' Ricardi seedlings were magnificent in his garden at Balaruc but they needed the strong soil and the hot climate to keep them healthy. The brilliant sunshine, too, lit up the sombre colourings of some varieties which we are apt to think rather dingy in this country.

It was in France that the possibilities of I. trojana as a parent were first realized and chiefly by the house of Vilmorin, Andrieux et Cie. Even if Isoline, which clearly shows its trojana parentage, is not a success in every garden, Alcazar does well everywhere and is an excellent seed parent. More recently the same firm has given us Ambassadeur, Ballerine, Magnifica and lastly the yellow Chasseur.

Other French raisers are MM. Millet et Fils of Bourg-la-Reine, to whom we owe Corrida (32ins.) with bleu d'horizon standards and slightly darker falls and the well-known Souvenir de Mme. Gaudichau ; and MM. Cayeux et Le Clerc of Vitry-sur-Seine, among whose best varieties are Ma Mie, Mme. Blanche Pion and the richly coloured Peau Rouge.

Of American varieties the best I have seen are Lent A. Williamson, Queen Caterina and Shekinah, but doubtless there are many more as good, as indeed there could hardly fail to be in a country where the hobby of raising seedlings seems to have seized hold upon so many gardeners and where they are now being raised in such vast numbers.

Miss Sturtevant was one of the pioneers in the work of raising new seedlings. She raised the beautiful variety Afterglow and then gave us Shekinah, the first of a race of tall, yellow Irises. One seedling of it, which has already flowered with me, certainly surpasses it, being of a richer yellow colour and having larger flowers of more substance. Another raiser, Farr, has given us Quaker Lady and Seminole and the number of raisers seems to be increasing rapidly every year.

The German firm of Goos und Koenemann became known when it introduced Iris King and Loreley. Variegatas seem to be popular in Germany and the latest addition to their number is Flaming Sword (Flammenschwert) which grows to nearly three feet in height and has golden yellow standards and falls of velvety crimson-maroon edged with yellow.

XVII.

A Note on Cultivation, on Raising Seedlings and on Diseases.

An attempt has been made in dealing with each species to point out its special requirements, if they are known, but there are a few general rules which anyone who wishes to cultivate Irises successfully should constantly bear in mind.

There are very few Irises that will flourish for long in waterlogged soil. Those that will are all of them beardless Apogons, such as pseudacorous, versicolor and laevigata. Kaempferi, setosa and the sibiricas like plenty of moisture in the growing season but are, I think, all the better for drainage in winter. The Bearded Irises all, without exception, want dry conditions and the only hope in damp situations is to make raised beds for them. They also need lime in the soil and this is, in most cases, best supplied in the form of old mortar rubble. The Apogons do not, as a rule, want lime, except possibly the Spurias and some, such as the Californians, will not grow in a soil that is highly charged with lime.

With regard to the time for moving Irises, the golden rule is to look at the roots. It is not necessary to dig up the plant in order to do this. The soil can

be carefully scratched away from the base of the leaves and then it is usually quite easy to see whether new roots are being formed. If they are, it should be safe to move the Iris and it is only the species that form large, fleshy rhizomes that will stand removal when root-growth is not active. The more slender species perish before they can take hold of the soil again. This accounts for the fact that we so seldom see such ideal rock garden plants as cristata, pumila, ruthenica doing really well. Yet if these are moved, broken up and replanted at the right time, they are capable of forming clumps which flower so freely as literally to hide the foliage.

Nearly all Irises are the better for sun and very few need shade, though a few will tolerate what gardeners call half-shade, such are gracilipes, cristata, verna, foetidissima and, I am inclined to think, tectorum.

Seeds must not be coddled and too great kindness in the shape of warmth and protection is likely to kill them. They should always be sown in the open and never under glass. A few weeks only before his death, Sir Michael Foster wrote to tell me that a hybrid Oncocyclus seed had just germinated after lying dormant in the ground for eighteen years and I have raised plants from seeds more than ten years' old. Under glass they would certainly have rotted. However, it must not be supposed that all Iris seeds lie dormant for ten years. Fresh seeds of species should germinate readily in the first spring after they are sown, approximately at the time when plants of the several species begin to grow again. Hybrid seeds

are more irregular and in particular those of the Oncocyclus species.

Protection is, however, useful once the seeds have germinated and every endeavour should then be made to get the young plants to grow rapidly so that they may be planted out as early as possible. To allow them to become crowded in the seed pots and the roots to become matted checks them considerably.

Planting out seedlings is less toilsome when the ground is wet but do not wait for rain. Dig a few holes where the plants are to go with a heavy trowel and fill three or four with water ; then put a seedling in each before all the water has soaked away and draw the earth up to the base of the leaves. This should leave the surface loose and dry. Evaporation is then much less rapid than if the plants are watered after planting. This cakes the surface of the soil and assists evaporation. *See* also pp. 48, 33 and 189.

After planting no further attention will be needed except occasional weeding and loosening of the surface soil. Seedling plants will continue to grow until late in the autumn and, except in very severe seasons, remain more or less green throughout the winter.

The foliage of established plants of most Bearded Irises tends to die away in the autumn and the dead leaves should be removed from time to time in order to allow the rhizomes to be as dry as possible. Under no circumstances should Iris leaves ever be cut off short while they are still green in order to make them tidy. Unless the leaves come away from the rhizomes quite easily, they should be allowed to remain. In

the case of some Beardless Irises, such as I. sibirica, the leaves, though dead, stay attached until the spring but they may, in this case, and with advantage, be shortened in the autumn to about one third of their length.

Iris Diseases.

There are four distinct diseases which not infrequently attack our garden Irises. One which attacks Irises of the Reticulata Section is caused by the fungus *Mystrosporium adustum* and the treatment for this is given on page 32.

Rhizome Rot is caused by a bacillus *Pseudomonas iridis* which mostly attacks the base of the stem and causes it to collapse, usually when the flowers are just appearing. This disease can be recognized at once by its characteristic smell, the rhizome becoming soft and slimy. The best treatment is to lift the plant attacked and carefully cut away all diseased portions of the rhizome. It should then be washed in a bright pink solution of potassium permanganate, replanted in fresh soil and sprinkled with superphosphate of lime. This should be washed in with water if the weather is dry. An ounce or two of superphosphate to the square yard, scattered over beds of Bearded Irises at flowering time, should check the disease and at the same time provides the plants with the lime that they need. Care should be taken to apply the superphosphate when the leaves are dry, for otherwise it will stick to them.

The other two diseases are Leaf Spot which attacks the leaves of Irises, especially in wet autumns, and the

rarer Leaf Rust which seems to occur most frequently on Regelia and Regeliocyclus Irises and sometimes to spread to ordinary Bearded varieties.

Leaf Spot, which is due to *Heterosporium gracile*, appears as pale, round or elliptical spots on the leaves, which gradually become more numerous until they cover the whole of the surface. The leaves then die away prematurely and the rhizome is consequently weakened. This disease is rarely found on soil in which there is plenty of lime and the best remedy is to scatter slaked lime over the surface of the beds in the autumn after first removing as much as possible of the dead and dying foliage. Beds for Bearded Irises can scarcely have too much old mortar rubble added to them and, when this is done, Iris Leaf Spot should not be troublesome.

The rust, Puccinia iridis, appears as small reddish-brown rusty spots and the remedy is to spray at intervals of two or three days either with a solution of one ounce of potassium sulphide in two or three gallons of water or with ammoniacal copper carbonate solution. The latter is prepared by dissolving three ounces of sulphate of copper and three ounces of carbonate of soda in a quart of concentrated ammonia, which is then diluted with twenty-two gallons of water.

AN ALPHABETICAL LIST OF SPECIES

GIVING HEIGHT, TIME FOR PLANTING AND TIME OF FLOWERING.

The figures given must be looked upon as approximate since much depends on soil, aspect and season, as well as on the situation of the Garden. When after a cold spring, the weather suddenly turns warm early in May, the Iris season is considerably shortened and many species are in flower together which in normal seasons flower in succession one after the other. The flowers of the dwarf and practically stemless species are generally raised above the ground by a perianth tube several inches long.

Name of Species.	Height of Stem in inches.	Best date for planting*	Usual time of flowering.	Described on page
ACUTILOBA ...	2—4	October	May	156
AITCHISONII ...	12—20	September—October	March—April	55
ALATA	1—2	September	November—January ...	50
ALBERTI	18—24	August—September ...	May	210
ALBICANS ...	15—18	August—September ...	May	211
APHYLLA ...	6—15	August—September ...	April—May—Sept.—October .	204
ARIZONICA ...	20—30	September	May—June	125
ATROFUSCA ...	8—12	October	May	157
ATROPURPUREA ...	6—8	October	May	158
AUREA	36—40	September—October	June—July	110
BAKERIANA ...	½—1	September—October	January—February	35
BARNUMAE ...	2—6	October	May	158
BILIOTTI ...	30—36	August—September ...	May—June	217
BISMARCKIANA ...	12—15	October	May	159

*The date given is, on the whole the best, when the plants have to be moved from one garden to another.
See also the chapters on the different sections

Name of Species.	Height of Stem in inches.	Best date for planting*	Usual time of flowering.	Described on page
BLOUDOWII ...	4—6	September—October	April	200
BOISSIERI ...	8—12	September—October	June	74
BRACTEATA ...	4—6	May—June ...	May	117
BUCHARICA ...	12—18	September—October	April	58
BULLEYANA ...	15—18	September	May—June	99
BUNGEI	3—6	September—October	———	132
CAUCASICA ...	1—4	September—October	February—March	56
CHAMAEIRIS ...	1—10	August—September ...	April—May	201
CHRYSOGRAPHES ...	15—18	September	May	96
CLARKEI	18—24	September	May	100
COLLETTII ...	½—2	March	July	22
CRISTATA ...	½—1	May—June ...	May	84
CYPRIANA ...	36—40	August—September ...	June	218
DANFORDIAE ...	1	September—October	January—February	36
DARWASICA ...	12	October	April—May	171
DELAVAYI ...	36—48	September	June	95
DICHOTOMA ...	24—30	May—June ...	July—August	87
DOUGLASIANA ...	12—18	May—June ...	May	116
ENSATA	2—12	September—October	April—May	139
FALCIFOLIA ...	6—10	October	———	172
FARRERI ...	6—8	September—October	May	108
FILIFOLIA ...	10—15	September—October	June	75
FLAVISSIMA ...	1—3	May or September ...	May	199
FOETIDISSIMA ...	18—24	September—October	June	142
FOLIOSA	4—6	August	June—July	129
FONTANESII ...	8—12	September—October	May—June	77

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Name of Species.	Height of Stem in inches.	Best date for planting*	Usual time of flowering.	Described on page
FORRESTII ...	12—18	September	May	98
FOSTERIANA ...	6—8	September—October	April	57
FULVA	18—24	August	June—July	128
GATESII	12—18	October	May	159
GERMANICA ...	18—24	August—September ...	May	215
GONIOCARPA ...	4—12	September—October	May	178
GRACILIPES ...	6—10	June	May	83
GRAMINEA ...	4—10	September	May—June	105
GRANT-DUFFII ...	6	September—October	April—May	131
GRIFFITHII ...	6—8	May or August ...	April—May	203
GRIJSI	4—6	———	———	131
HALOPHILA ...	18—24	August—September ...	June	109
HENRYI	2—8	———	———	131
HEXAGONA ...	36	August	June—July	129
HISTRIO	1	September—October	December—January ...	38
HISTRIOIDES ...	1	September—October	January	37
HOOGIANA ...	18—24	October	May	172
HOOKERIANA ...	4—5	September—October	May	177
HUMILIS	1—2	September	May	105
IBERICA	3—6	October	May	160
IMBRICATA ...	12—20	August—September ...	April—May	209
JAPONICA ...	18—20	May or September ...	April	79
JUNCEA	10—15	September—October	June	73
JUNONIA	20—30	August—September ...	June	217
KAEMPFERI ...	18—30	August	June—July	134
KASHMIRIANA ...	18—24	August—September ...	June	213

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Name of Species.	Height of Stem in inches.	Best date for planting*	Usual time of flowering.	Described on page
KERNERIANA ...	6—12	September	———	107
KOLPAKOWSKIANA...	1	September—October	———	34
KOROLKOWI ...	12—15	October	May	173
KUMAONENSIS ...	1—3	September—October	May	177
LACUSTRIS ...	½—1	May—June ...	May	85
LAEVIGATA ...	15—18	August—September ...	June	136
LONGIPETALA ...	18—24	August	May—June	123
LORTETI	8—12	October	May	160
MACROSIPHON ...	2—4	May—June ...	May	120
MADONNA ...	15—18	August—September ...	May	211
MANDSHURICA ...	3—6	September—October	———	201
MEDA	3—4	October	May	161
MELLITA	1—4	May or September ...	April—May	196
MESOPOTAMICA ...	36—40	August—September ...	June	218
MILESII	24—36	August	June—July	82
MINUTA	2	September or March	April—May	132
MISSOURIENSIS ...	18—24	September	May—June	124
MONTANA ...	15—20	September	May—June	125
NEPALENSIS ...	8—18	March	July	21
OCHROLEUCA ...	30—48	September—October	June—July	110
ORCHIOIDES ...	8—14	September—October	March—April	57
ORIENTALIS ...	18—24	September—October	May—June	93
PALESTINA ...	1—2	August—September ...	November—January ...	51
PALLIDA	18—36	August—September ...	May—June	206
PARADOXA ...	4—6	October	May	161
PERSICA	1—2	September—October	February	52

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Name of Species.	Height of Stem in inches.	Best date for planting*	Usual time of flowering.	Described on page
POTANINI ...	1	August—September ...	———	197
PRISMATICA ...	18—20	September	May	101
PSEUDACORUS ...	24—36	September—October	May—June	137
PSEUDOPUMILA ...	4—8	August—September	April—May	202
PUMILA	½—2	August—September	April	195
PURDYI	4—6	May—June ...	May	119
REICHENBACHII ...	4—10	August—September	April—May	198
RETICULATA ...	1	September—October	February and March ...	39
ROSENBACHIANA ...	1—2	September—October	January—March	60
ROSSII	2—4	———	———	132
RUTHENICA ...	2—8	May—June ...	May	148
SARI	6—8	October	May	162
SCARIOSA ...	2—6	August—September ...	May	198
SETOSA	6—24	September	June	143
SIBIRICA	24—40	September	June	92
SIKKIMENSIS ...	4—6	September—October	May	178
SINDJARENSIS ...	9—12	September—October	February—March	54
SINTENISII ...	4—12	September	May—June	106
SISYRINCHIUM ...	1—12	September—October	May—June	24
SOFARANA ...	12—15	October	May	162
SONGARICA ...	12—15	———	———	108
SPECULATRIX ...	6—12	———	———	84
SPURIA	15—36	September	June	111
STOCKSII ...	2	September—October	April	57
STOLONIFERA ...	12—24	October	May	173
SUBBIFLORA ...	8—12	August—September ...	April	203

*The date given is, on the whole, the best, when the plants have to be moved from one garden to another. See also the chapters on the different sections.

Name of Species.	Height of Stem in inches.	Best date for planting*	Usual time of flowering.	Described on page
SUSIANA	12—15	October	May	163
TECTORUM ...	12—15	August	May	81
TENAX	12—18	May—June ...	May	118
TENUIFOLIA ...	2—6	———	———	132
TENUIS	10—12	May—June ...	May	117
TENUISSIMA ...	12	May—June ...	May	121
TIGRIDIA ...	1—3	August—September ...	April	197
TINGITANA ...	18—24	October—November	April—May	76
TRIPETALA ...	12	September	June—July	144
TROJANA ...	24—30	August—September ...	May—June	214
TUBERGENIANA ...	2—4	September—October	March	54
UNGUICULARIS ...	1—2	September	November—March	144
URUMOVII ...	4—8	September	April—May	107
VARIEGATA ...	12—20	August—September ...	May—June	212
VARTANI ...	1	September—October	December—January ...	38
VENTRICOSA ...	4—6	———	———	132
VERNA	1—2	March or June ...	April—May	147
VERSICOLOR ...	18—36	September—October	May—June	138
WARLEYENSIS ...	6—12	September—October	March—April	59
WATTII	18—36	April—May ...	April	80
WILLMOTTIANA ...	4—6	September—October	March—April	56
WILSONII ...	18—24	September	June	97
WINKLERI ...	1	September—October	February—March	35
XIPHIOIDES ...	8—18	September—October	June—July	69
XIPHIUM	8—24	September	May—July	71

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A List of Synonyms sometimes used in Gardens.

AEQUILOBA	= a form of pumila.
AMOENA	= a garden Bearded Hybrid.
ATTICA	= a form of pumila.
BIFLORA	= a form of aphylla.
BIGLUMIS	= ensata.
BOHEMICA	= a form of aphylla.
CRETENSIS	= the Cretan form of unguicularis.
CUPREA	= fulva.
FIEBERI	= aphylla.
FIMBRIATA	= japonica.
FLAVESCENS	= a garden Bearded Iris.
FURCATA	= aphylla.
GIGANTEA	= a form of ochroleuca.
HELENAE	= Mariae.
HUNGARICA	= aphylla.
LOPPIO	= a form of cengialti.
LURIDA	= a garden Bearded Hybrid.
LUTESCENS	= a form or hybrid of chamaeiris.
MARICOIDES	= sisyrinchium.
NEGLECTA	= a variegata with a purple ground.
NUDICAULIS	= aphylla.
PAVONIA	= a South Africa Morea.
STATELLAE	= chamaeiris or pseudopumila.
VIRESCENS	= chamaeiris.

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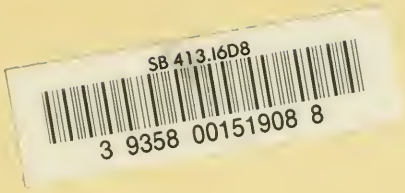

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